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AUTOMOTIVE INDUSTRIES

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Buses Becoming Better Passenger Cars Every Day

Exhibit at American Electric Railway Association meeting shows trend away from truck design. A. J. Brosseau says buses will supplement, not eliminate, electric lines.

By Herbert Chase

MODERN advanced designs in buses are tending more and more toward passenger car practice and away from truck practice in most particulars. In size and weight the latest vehicles of this type, shown last week at the exhibit held at Atlantic City in connection with the annual convention of the American Electric Railway Association, were, of course, much larger and heavier than the largest of private cars, but both chassis and body are designed to give comfortable riding and naturally resemble the standard passenger car in design as well as in appearance, for in reality they are passenger cars in the most approved sense of this word.

Strictly utility or so-called "street car" types of vehicle were not lacking, but were slightly less in evidence than the club or deluxe types which are meeting with much popular favor, especially for high speed interurban service. It is commonly believed that the interior fittings and upholstery of the de luxe coach is apt to prove less serviceable than the more severe counterpart of the body intended for mass transportation, but even in the latter much is being done to make the seats more comfortable and both interior and exterior more attractive.

It begins to look as if the public is quite willing to pay for additional comfort and the coach manufacturer is preparing to meet the demand.

Coach chassis have undergone a complete revision during the past three years. Primarily the changes made have been those calculated to increase riding comfort and to promote safety, at the same time, in

many cases, increasing both the maximum speed and the seating capacity.

This has involved greater weight and necessitated the use of more powerful engines. In consequence there appears an increase in the number of six-cylinder engines and of six-wheel chassis, the former to give greater power with smoother operation and higher speed and the latter to afford better riding comfort, distribute the load and avoid the inconveniences and other disadvantages of side-by-side tire mounting. Incidentally pneumatic tires are displacing solids even on double-deck vehicles.

MOST of the pneumatics are mounted on 20-in. disk wheels and have substantially the same nominal dimensions as certain of the balloon sizes. This has given rise to the conclusion, even among some bus engineers, that the tires are, in fact, balloon tires, whereas they are not properly given this designation, in the generally accepted meaning of the term, since they have, at least as a rule, eight or more plies and require high inflation pressures for durability in service.

Electric railway men and a vast majority of those in the automotive industry who have given the matter careful study are far from reaching the conclusion expressed by one prominent engineering executive at the recent S. A. E. transportation meeting in New York to the effect that the motor bus will drive the trolley car out of business within five years or even a much longer period. A. J. Brosseau, speaking on behalf of the National Automobile Chamber of Com-

merce, said definitely that the trolley has a distinct place and function in modern transportation systems. In some cases the bus has and will supplant the trolley, but more often it will supplement and be coordinated with existing trolley systems.

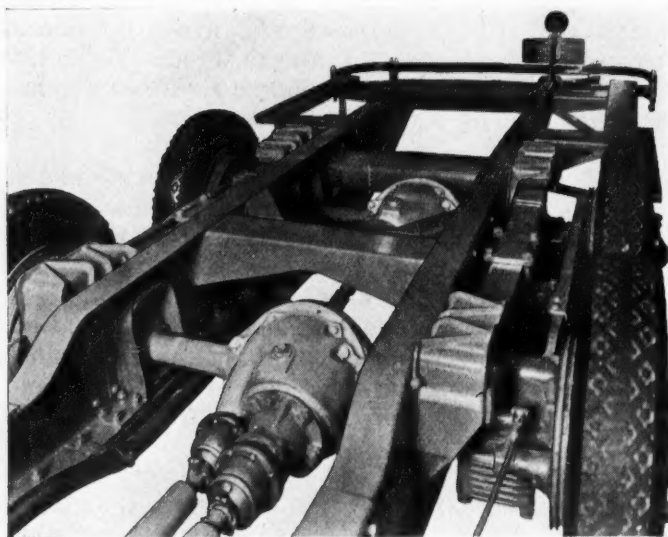
Proof of the value of buses in connection with existing transportation systems now is so far beyond question that electric railway executives and engineers are taking a keen interest in motor coach developments and have welcomed exhibits of both complete vehicles and component parts, while many manufacturers in the electric railway field have taken on the production of such parts and equipment. Nearly a third of the extensive show space on the Million Dollar Pier was taken up by exhibits of complete buses or chassis and possibly 20 per cent more by exhibitors of automotive parts and equipments—a striking indication of the important position the automotive industry is taking in the passenger transportation field.

Some Larger Buses Noted

Increasing competition between trolley and bus naturally leads to comparisons in carrying capacity and operating expense. Obviously it costs less per passenger in driver's wages for a bus that carries 35 passengers than for one which seats only 25. This, together with the demand for easy riding, safety and high speed are among the factors which have led to the development of what is termed the Mack Greatcoach, which was one of the new and striking features of the show.

This undoubtedly is the largest bus chassis ever built and still is in the experimental stage. It has 266-in. wheelbase, measures 34 ft. over bumpers and is said to weigh 11,000 lb. Its massive frame and rear end constitute the closest approach to Pullman car construction ever attempted in the automotive industry. The frame measures about 32 ft. in length, is of pressed steel and of such enormous proportions that it had to be made in two sections. The industry has neither presses nor heat-treating pots large enough to handle the side rails if made in a single piece.

Two rear axles carry the four rear wheels and the



Rear end of Mack's new six-wheel experimental bus chassis which has 266-in. wheelbase and measures 34 ft. long over bumpers

drive is through two propeller shafts with a differential unit between. This differential unit is housed in a case near the center of the chassis. From the front of the case projects a drum shaft connected by a propeller shaft to the new $4\frac{1}{4}$ x 6-in. six-cylinder 100 hp. Mack

engine, and two arms which support two wide brakes. From the rear of the case two propeller shafts turning in opposite directions extend to the forward one of the two rear axles. The left shaft drives the bevel pinion in this axle while the right one passes through the axle casing and is connected to another propeller shaft driving the rearmost axle.

These two axles are of the Mack banjo type and are connected to the ends of two underslung springs by four rubber shock insulators. Two radius arms, one projecting back from the forward axle and the other forward from the rear axle in reverse fashion, are employed. Anchorages of these arms are also in shock insulator blocks. At the center the springs are pivoted in floating bearings attached also to the centers of two secondary springs, the ends of which are supported in shock insulators in brackets attached to the frame. The two springs at each side form an X-type unit, the upper spring of which is longer than the lower. The two pivots referred to are cross-connected by a U-shaped member of chrome-nickel spring steel.

This relatively flexible arrangement permits of individual movement of the axle ends and wheels without binding. The axles are located between the heavy channel frame members, which are slotted to permit of vertical movement. The slot cuts through the lower flange of the channel, but this whole section of the frame is reinforced around the slots and under the lower channel flange by secondary channels with section opening downward.

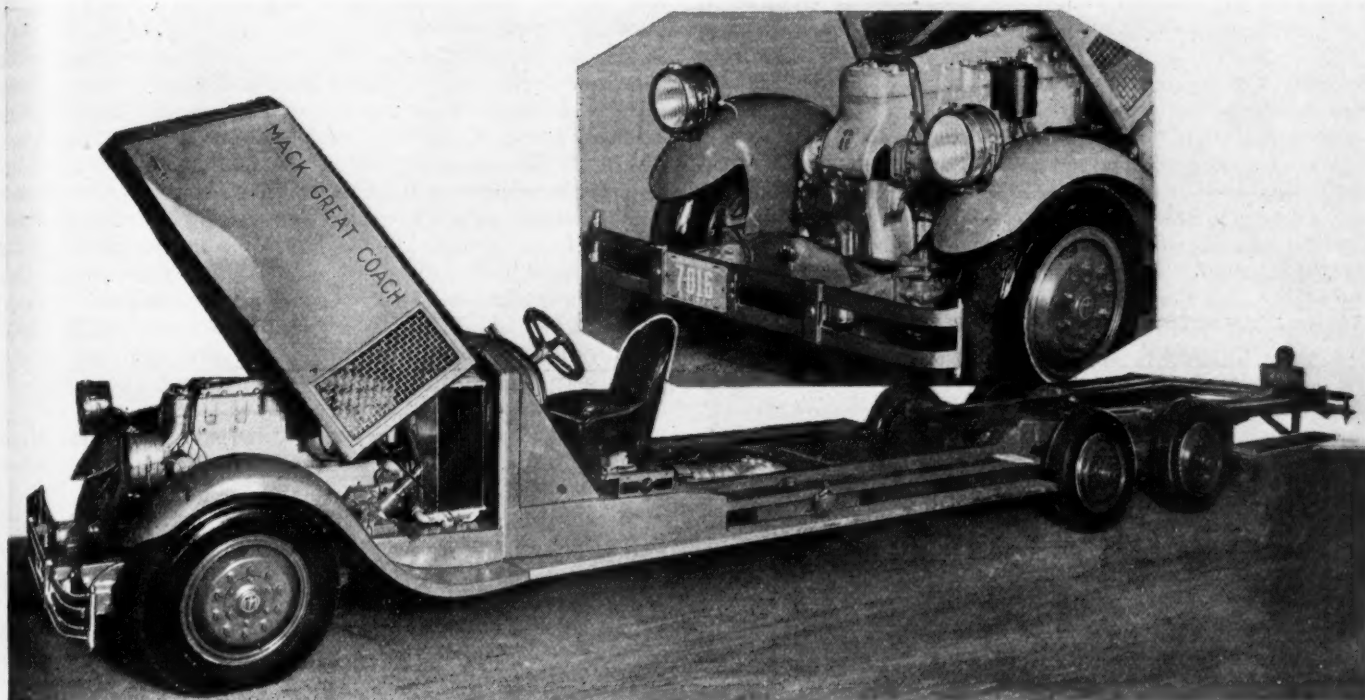
Mack Great Coach Has Massive Frame

Back of the axles the frame side rails taper rapidly, forming a cantilever support for the rear overhang. An 8-in. tubular cross member is located just aft of the axles and a heavy channel cross member forward of them. Just ahead of this point the main channel section is tapered from about 16 to about 10 in. to form joints with the straight channels from which the forward end of the frame is constructed. The deeper rear channel is contracted to fit over the narrower forward section and make a strong riveted joint. The rear portion of the frame is 4 in. higher than the forward end, the top of which is $20\frac{3}{4}$ in. above the ground. Side rails are straight as viewed in plan.

At the front end is a heavy drop center axle carrying T-shaped knuckle forgings, which turn about vertical axles, but are recessed into the wheel to give practical centerpoint steering. The knuckles support live wheel spindles which slope enough to give the wheels a two-degree rake or undergather. In the wheels are pairs of expanding brake shoes operated by an overhead cam in the axis of the knuckle. The main flat front springs rest in shock insulators and are supplemented by two small cantilever springs fastened to the front end of the frame and projecting backward at a sharp angle to a bracket near the knuckle pivot, where they terminate in small rubber shock insulator blocks.

These supplementary springs are intended primarily to take the torque reaction of the front wheel brakes, but, of course, they have some effect upon the suspension. Aside from this arrangement of axle and springs the front end of the vehicle is arranged in much the same as other Mack buses, the radiator being behind the engine with fan incorporated in the flywheel. Fuel feed is by Stewart Warner vacuum system with a supplementary system incorporating a pair of sylphon magnetic pumps, operated from the ignition system.

Other new chassis which attracted considerable attention included the models X and Y of the Yellow Coach Mfg. Co., models KB and 56 brought out by the Garford



Two views of the Mack great coach chassis, probably the largest motor bus chassis ever built. It is intended to carry a 33-passenger de luxe body. Note six-cylinder engine and front axle with live spindles and novel brake arrangement

Motor Truck Co., the "Safeway" Six-Wheeler described several weeks ago in these columns and the Uppercu coach chassis described on another page of this issue.

Both of the new Yellow Coach chassis are similar in general design to the Model Z shown a year ago and which is continued with some changes. The Model Y is noteworthy partly because of the arrangement of the new six-cylinder Yellow Sleeve valve engine, recently described in these columns, and a new air brake system with water cooled compressor driven off the front end of the crankshaft, supplying air to brakes mounted on all four wheels. This brake system is made complete by the Yellow Coach Co. and is supplied as optional equipment at extra cost.

Yellow Coach Chassis Has Offset Engine

Frame cross members are of tubular form, as is also a fore and aft member running between the two front cross members. This tube is a little to the right of the center line of the frame and serves the double purpose of supporting one side of the engine and acting as an exhaust pipe. The whole powerplant is set close to the left side of the frame, considerably off the center line of the chassis. This is done primarily to bring the bevel gear housing of the rear axle to one side where it will be under the seat at the wheelhouse instead of in the center of the aisle. It also brings the controls further to the left and enables the driver to reach them easily even though they are mounted on the gearset housing.

Other advantages of the off center arrangement are the added space afforded for entrance and exit, and the fact that a central longitudinal beam can be employed to strengthen the floor and thus lighten its weight.

A steering lock of 43 deg. is secured without using a bent draglink.

A contracting brake on a drum with integrally cast fan blades, located just back of the gearset, is operated by hand.

This Model Y chassis has 225 in. wheelbase, $4\frac{1}{4}$ x $5\frac{1}{2}$ in. six-cylinder Knight engine, four-speed gearset, semi-floating spiral bevel rear axle designed to carry double

32 x 6 in. pneumatics on 29 in. Budd-Michelin disk wheels. Bodies which seat from 21 to 28 passengers are furnished.

The Model X Yellow Coach chassis is similar in general design to the Model Y except that the powerplant is not offset and the rear axle is located very close to the rear end of the frame. This is a smaller chassis than the Model Y and has 205 in. wheelbase, a $3\frac{1}{2}$ x $4\frac{1}{2}$ in. six-cylinder Knight engine, four-speed gearset, semi-floating spiral bevel rear axle designed to carry double 32 x 6 in. pneumatic tires on Budd-Michelin disk wheels. It is fitted with either a 21-passenger pay-enter body or a 17-passenger sedan type. Four-wheel foot operated hydraulic brakes and a gearset hand brake are employed.

Garford showed two new chassis termed respectively Type KB and Type 56, with 180 and 220 in. wheelbase. The smaller of these is fitted with a six-cylinder $3\frac{3}{8}$ x 5 in. engine, Timken rear axle and four-wheel hydraulic brakes of the contracting type. The frame has $6\frac{7}{8}$ x $2\frac{1}{4}$ in. channel side rails kicked up over the rear axle and its top is only $20\frac{1}{2}$ in. from the ground. This chassis was shown fitted with a sedan type 15-passenger coach but is furnished also with a pay-enter type of body.

A six-cylinder engine of $4\frac{1}{2}$ in. bore and $5\frac{3}{4}$ in. stroke is used in the larger of the two Garford chassis. The drive is through a Brown-Lipe clutch and gearset to a Timken rear axle. A kicked-up pressed steel frame, the top of which is $20\frac{1}{2}$ in. from the ground, is employed. Foot-operated four-wheel hydraulic brakes and hand-operated rear wheel brakes are fitted. This chassis was shown fitted with a body termed the Regent sedan, designed to seat thirty people. It is furnished also with a pay-enter type of body. The four-cylinder 51-D chassis shown last year is continued.

Great Variety of Bodies Shown

Fully as much interest was shown in bodies as in chassis, and a great variety of designs were exhibited. At the present time most bodies are built to order by specialists in this field, but some manufacturers have their own

body building facilities and are prepared to furnish a standard line of body models.

As indicated, the de luxe bodies were very much in evidence. Many of these compare in lines, finish and interior trimmings with high grade custom built passenger car bodies. Some makers, including Fageol and Yellow Coach, are using exclusively pyroxylin finishes, the durability and easy cleaning of which are features which appeal greatly to the purchaser.

There were about the usual number of sedan type bodies with individual doors affording access to each cross seat. In some cases a rear smoking compartment or baggage compartment is a feature of the design.

A marked increase in the number of club or parlor type bodies with a single entrance door beside the driver's seat was noted. Since this type requires a center aisle, its seating capacity may be somewhat less than a sedan type with seats running the full width of the chassis, but it has the advantage of requiring only a single door controlled by the driver. Light weight wicker seats are much used in this type of body, and they are fitted with deep leather cushions usually made in double deck patterns. In some cases the upper cushion is simply padded while only the lower has box springs. In others springs are used in both upper and lower cushions.

Seating Arrangements Varied

When the bus is intended for comparatively long hauls a rather narrow aisle is considered permissible in order to secure wider and more comfortable seats. In this case double seats are used at each side of the aisle. When more aisle space is desired single seats are used at one side and double on the other. Quite often double seats are separated by a central arm which adds to the riding comfort. This form of seat is said to be practically as comfortable as that in private closed cars and is sufficiently durable to meet operating requirements when the passengers are willing to pay for additional comfort secured.

Much has been done even on pay-enter city type buses to increase riding comfort and relatively few of the hard cane seats which are popular in street car work now were shown. In fact, the cane covering is said by some to be less durable than some of the better grades of artificial leather or genuine leather. Seat cushions which have springs affording a reasonable degree of riding comfort

are employed in both single and double deck buses intended for city service.

Fageol, Yellow Coach, Fifth Avenue Coach and Uppercu Coach showed chassis fitted with double-deck bodies. Much has been done to decrease over-all height of these bodies. In the Fageol job most of the seats on the upper deck are arranged longitudinally back to back, the space under the seat proper being open below to afford the necessary head-room in the aisle for passengers using the lower deck. The ceiling at points above the heads of passengers seated in the lower deck is several inches lower than the ceiling above the aisle. In the Uppercu double-deck coach a similar result is attained by dropping the floor of the upper deck under the seats, but the latter are arranged transversely in conventional fashion instead of longitudinally as in the Fageol body.

A number of improvements are being made in city type bodies, nearly all of which are calculated to increase the comfort of the passengers.

In addition to more comfortable seat cushions and backs, the seats themselves in at least one body were mounted on spring pedestals. This was a Schaefer body on a White chassis. The seats in this case are supported by two C-shaped pieces of flat spring steel under the front edge and two helical coil springs under the rear corners. In the same body quick acting aluminum window flaps take the place of garnish rails and serve the three-fold purpose of covering the window well when the sash is down, holding the window up at various elevations and covering the well when the window is up, thus preventing dirt and water from accumulating in the well. These flaps are hinged above the inner panel of the body and can be turned inward when the window is to be moved. Stops fastened to the window frame rest against the flap and hold the window at any desired height.

Brass window sash are now widely used in place of wood.

Other features intended to produce passenger comfort are ventilators and better interior lighting arrangements. In most cases the interior roof structure is enameled in white to better its light reflecting qualities.

Schaefer bodies are fitted with air inlets above the windshield and at each side of the body near the floor, and with ventilators in the roof for carrying off foul air. The ventilating duct near the floor has outlets around the heating pipes so that incoming air is warmed on its way



Meritas fabric "club car" body built by E. J. Thompson Co. and mounted on Mack chassis, is said to weigh 500 to 700 lb. less than a steel panel body. Belt panel is of red fabric-leather edged with aluminum

into the body compartment. Another feature of the Schaefer body referred to is the use of a spring steel guard rail which, beginning just back of the entrance door, runs along the right side of the body, around the rear end and back along the left side to the cowl. This is separated from the body by a space of about 3 in. on the side and 6 in. in the rear, is supported on substantial brackets and serves to prevent scratching the body side panels while serving also as a rear bumper. It is placed at approximately the floor height.

Yellow Coach exhibited some very attractive bodies finished outside with Nick-o-lac pyroxylin enamel. In some cases the interior, including the roof structure, is covered with three-ply mahogany Haskelite, which affords an unusually attractive appearance and is easy to keep clean. In this case wicker seats with Marshall springs in both upper and lower cushions are employed.

Exterior body panels are covered with 14-gage aluminum and no wood is exposed. The floor of the body referred to, which is a city type single deck pay-enter type mounted on a Y chassis, is of $\frac{3}{4}$ in. Haskelite reinforced with five longitudinal beams, one at each outer edge, one in the center and two between the center and outside. This gives a light but strong floor and reinforces the whole body structure.

Club Type Bodies Much in Evidence

Many of the de luxe sedan and club bodies are fitted with draped curtains of rep or similar material. These add to the dressy appearance, but some are inclined to doubt whether they will prove serviceable. Window sashes are now being made wider than was usual heretofore, with pillars on corresponding wider centers.

One of the custom body exhibits was that of the E. J. Thompson Co., who showed a Meritas fabric club body on a Mack chassis. In this body the same type of construction used in passenger cars by the same company is employed. The use of fabric in place of steel panels is said to effect a saving of 500 to 700 lb. in weight.

This body presents a handsome appearance. It is covered with black Meritas fabric leather up to and above the belt line, but a narrow panel of red fabric leather is used between the two belt line moldings. The moldings themselves are polished aluminum with a narrow strip of black fabric leather appearing between two aluminum beads. The interior of this body is trimmed with soft gray morocco finish leather and the wicker seats are upholstered in red morocco leather. The floor is covered with rubber tiling and small mirrors are placed at each window pillar. In general arrangement this interior, shown in an accompanying photograph, is similar to that of several of the de luxe club cars exhibited.

Among the other body manufacturers who showed attractive bodies may be mentioned Bender, Kuhlman, Schaefer, Buffalo, Superior, Lang, St. Louis Car, Hoover, Brown and Lansing.

Parts Makers Well Represented

A large number of parts makers were represented at the show and some of them exhibited entirely new products for the first time. The Waukesha Engine Co. had a new six-cylinder $4\frac{1}{2} \times 5\frac{3}{4}$ bus engine said to develop 100 hp. at 2000 r.p.m. This has an aluminum crankcase which comes more than half way up the cylinders, which are cast in pairs. It is said to weigh about 1100 lb.

Timken Axle showed its latest line, including a combined lockheed hydraulic and air brake system. The control member of this brake is a Westinghouse valve which admits air to a diaphragm connected to the master hydraulic cylinder. This diaphragm and cylinder are mounted on the frame, hence a diaphragm of large diameter can

be employed. In consequence a comparatively low air pressure makes it possible to create an oil pressure of some 400 lb. As a result the hydraulic cylinder which actuates the brake mechanism is of quite small size and can be placed inside the brake drum. This overcomes one problem in connection with air brakes in that diaphragms large enough to give the desired total pressure are somewhat awkward to mount, especially for the operation of front wheel brakes.

Eaton showed a new full floating double reduction bus axle of 12,000 lb. spring capacity. This employs a herringbone gear in the final drive and is made as narrow from



Wicker seats with leather upholstery are popular, as shown by this interior view of Thompson Meritas body

top to bottom as correct proportioning of parts permits in order to give as much road and body clearance as possible. Maximum depth above and below axle centers is $6\frac{3}{4}$ in. and ground clearance with 36 in. tires is $11\frac{1}{4}$ in. The axle ends are chrome nickel steel tubular inserts, which make it possible to vary the track width as desired.

Brakes of either internal shoe or external band pattern can be furnished and there is provision for mounting of air brake diaphragms on flanges adjacent to the axle centers when desired. All gears can be withdrawn through the rear opening. Total weight of axle is approximately 1000 lb. Ratios available run from $4\frac{1}{2}$ to $7\frac{1}{2}$ to 1.

Sheldon's exhibit included a line of front axles for buses, the latest one of which is arranged for mounting an air brake diaphragm directly on the front brake drum cover. This diaphragm operates a cam of unusual design which bears against one end of one brake shoe. The other end of this shoe is pivoted to the second shoe in such a way as to give a certain servo action. The retractor spring is supported at the center by a clamp which, when released, enables the shoes to adjust themselves automatically to a position such as to equalize wear.

Many favorable comments were heard concerning the show itself and the ease with which prospective customers were put in contact with the men in the manufacturing organizations represented whom they wished to see.

ACCORDING to a recent report by the British commercial attaché in France, the French automobile industry shows marked improvement owing to the adoption of quantity production methods and the low exchange value of the franc.

New Austin Seven Horsepower Model Has Frameless Body

British light car intended as a substitute for motorcycle and side car, also has unusual chassis construction. American observers are impressed by good riding quality. Complete vehicle, capable of carrying four passengers, sells in England for £165.

By M. W. Bourdon

FRAME and body construction along radical lines are the noteworthy features of the 7-hp. light car made by the Austin Motor Co. of Birmingham, England. This car, intended as a substitute for the motorcycle and side car, has been in production for two years,* but engineering details have been made available only recently.

Although fitted with four-wheel brakes as standard equipment, and provided with a body capable of carrying four persons, the chassis has a wheelbase of only 75 in., while the four-cylinder water-cooled engine has a bore and stroke of 2.2 and 3 in. respectively and a displacement of only 45 cu. in.

Judged by American standards, therefore, the car is decidedly a miniature product. Nevertheless it meets British marketing conditions so well as to justify an output of 30 to 40 a day. The Austin plant is said to be taxed to the limit of its capacity without being able to meet the demand, although the car sells, with full electric equipment, spare wheel and tire, for £165.

The outstanding feature of the body is that, with the exception of wood fillets, to which the upholstery and trimming are secured, the entire shell, the floor and the cowl, consists of steel and aluminum sheet of 18 gage. No wood frame is employed. There are two detachable and adjustable front seats for adults and a full-width rear seat, intended for two children, but often occupied by two more adults.

After its first stage is completed the body comprises a form of tray, made up of sheet steel sections riveted together, with deep side flanges, and an inverted channel in the center running forward from the extreme rear end to the back end of a slot in the front floor space. This tray forms the flooring, a base for the rear seat, and a structure upon which the body sides and rear are erected. Where necessary, 18-gage stiffening plates, flanged or channeled, or both, are fitted. At each side behind the door openings—one at each side—the flanges extend upward for 12 in. and are themselves inwardly flanged to give lateral rigidity to the door "posts" while adding to that feature is an extension strip, riveted

on, which reaches the elbow line and fastens to the body.

On this tray, or base, aluminum panels are erected and riveted; these arrive at the assembly point as a unit, comprising four main sections welded together; the two side sections run from the rear corners to the front edge of the cowl, the rear panels joining them behind and the top of the cowl serving that function in front. The panels are rolled to shape before welding, though a slight amount of hammering is required to finish off the rear corners and cowl sides before the shell is ready for delivery to the painting department.

At its top edges, at the door openings and elsewhere, other than where it is joined to the steel tray by riveting, the paneling is flanged inwardly. The flanges are used at the top and at the door openings to locate wooden fillets, which are secured by screws passing through the flanges and which serve for fixing the upholstery and trimming and the door hinges and fasteners.

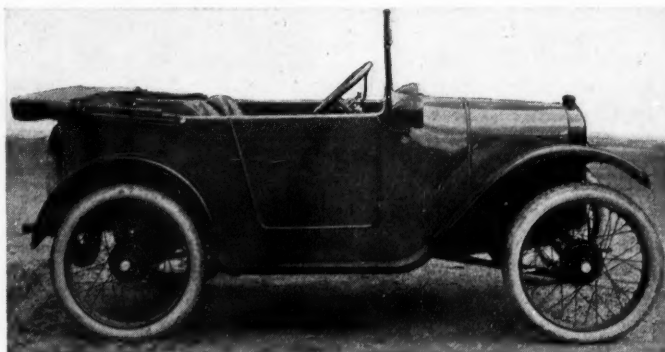
The front end of the cowl encircles a sheet steel dash. The instrument board is of the same material, but is not

fitted at this stage. Stiffening plates and brackets, all of 18-gage steel sheet, are fitted inside the paneling at a few points. For example, there is a plate at the center of the rear end, riveted to the aluminum panel and also to the central channel of the floor unit to help support, outside, a cup-shaped steel pressing that carries the spare wheel.

Each door comprises a light wood framing of four units, built up with overlapping joints, glued and screwed, and an aluminum flanged panel which incloses the frames, and is screwed to it. Two brass hinges are used, but a spring latch of the orthodox type is omitted. In its place is a hinged hook or clamp which passes over a projecting stud on the rear "pillar" of the door opening.

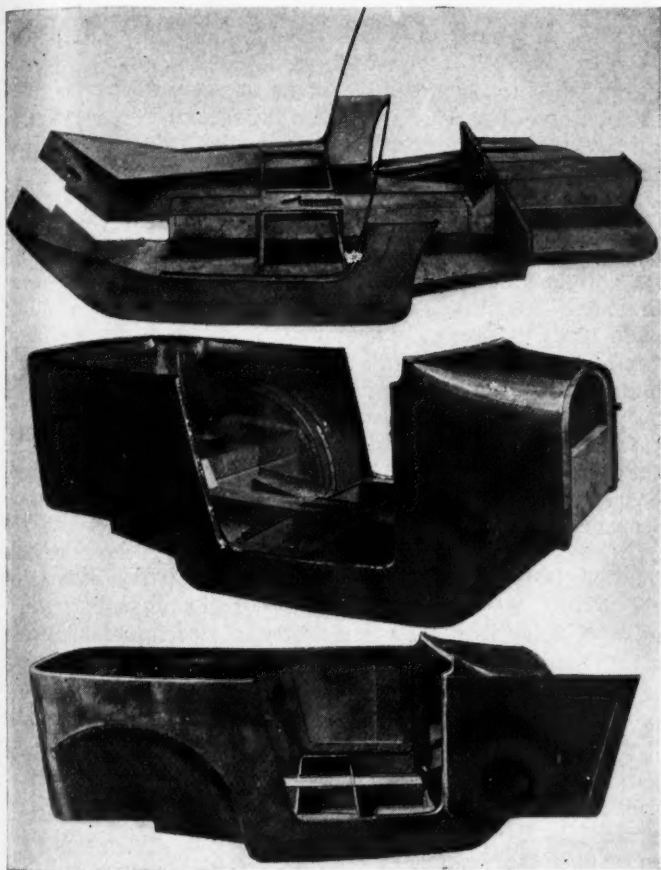
At this stage the body passes to the paint shop, where it is flow-painted inside and outside, the former in black and the latter with successive coats to a standard finish. Only one finishing color is offered; at the moment it is gray, but a variation is made periodically and a few months ago it was a dark green.

From the paint shop the body shell passes to the



Complete Austin 7-hp. car intended for two adults and two children or three adults. The body is a frameless structure using no wood except for attachment of trimmings

*See AUTOMOTIVE INDUSTRIES of Aug. 10, 1922, for brief preliminary description.



1—18-gage steel "tray" which forms the foundation structure for the 7-hp. Austin body. 2—Aluminum side, cowl and rear paneling in place. 3—Completed body shell, showing doors in place

finishing shop, where the brackets and hinge pins for the folding top and the vertical two-panel driving screen are the first items to be fitted. The framing of the windscreen has a second function in that it serves to brace the rear end of the cowl. Suitably shaped extensions of the side members form brackets for the combined side and head lights.

Next, instrument board, fuel tank and wiring are fitted, also certain control coupling units for attachment to the dash, the rear fenders and the steel running boards. The fuel tank, for gravity feed, is located under the cowl, where it is supported at the front in a flanged hole in the steel dash and at the rear by angle brackets. Its filler spout projects through the instrument board, the latter carried by the flanged rear end of the cowl.

No brackets or irons are needed for the rear fenders or the running boards. The fenders are held within wheel arches by screws and nuts, while the running boards are similarly fixed to the under side of the projecting edges of the body shell and additionally supported at the ends by the extremities of the fenders.

Seat back upholstery and trimming now are fitted, the former consisting of a completed unit, pleated and stuffed, which is tacked to the wood fillet at the top edge and, with the rear end of the black folding top, made doubly secure by being clamped down under a rolled aluminum beading which is attached by screws all around the elbow line of the body and door tops.

Rear seat back upholstery is fixed at its top edge only and when the car is completed this upholstery can be raised from the bottom, hinging on the upper edge to disclose a compartment for storing the rigid-framed side panels of the folding top. The trimming, or panel lining, consists of a set of plywood boards covered with leatherette, shaped and finished for tacking in position.

All the items mentioned in the foregoing arrive at the body finishing lines ready for assembly, painted or otherwise finished off as the case may be.

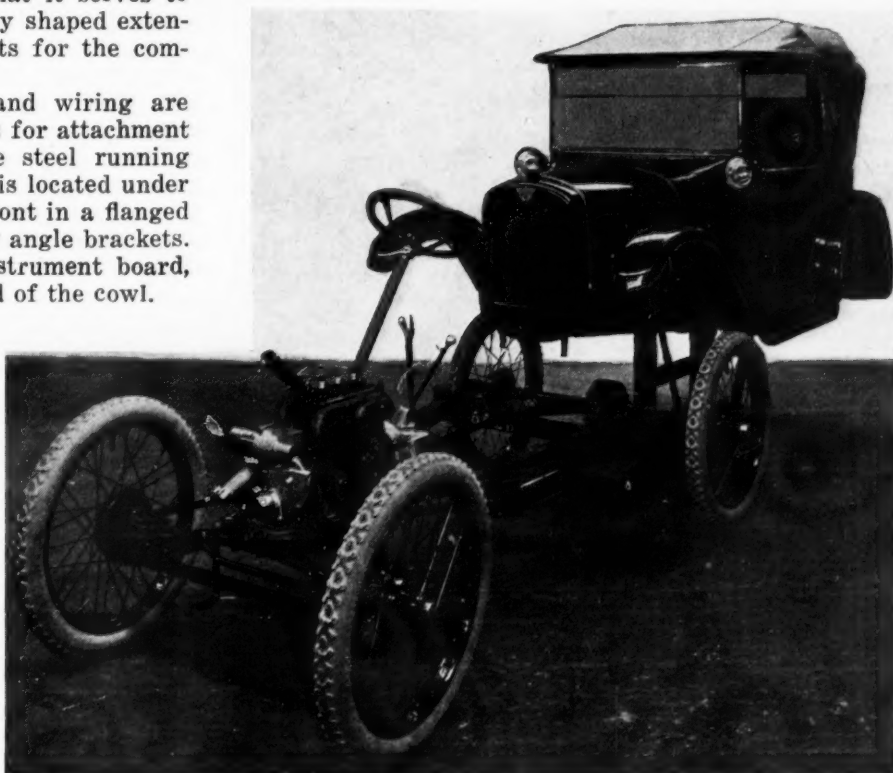
Also finished and painted ready for assembly, a unit which is termed the body extension now is put in place. This unit consists of the front fenders, valances of the latter and side "boards" adjacent to the hood, all of 18 gage steel. These members extend toward each other at the front, where they are united by the only piece of heavy gage metal in the body, a short length of flat steel which rests upon the central casting of the chassis frame that forms the spring anchorage.

Radiator Core Support

Another item of this unit is the radiator core supported in a steel shell, the shell in turn being carried by the front ends of the side members of the unit. The body extension unit is fastened at the rear by screws and nuts passing through the front end of the steel base or floor of the body. It also is fastened to the front ends of the running boards.

With lamps, horn and folding top in place, the body next is fitted onto the chassis, the wiring coupled up to the starter generator, the batteries fitted, radiator connected, rear seat cushion dropped onto its steel base integral with the body foundation, and the front seats put in position.

These front seats are an all-metal construction apart from the actual upholstery. They are separate units, adjustable fore and aft with a range of 6 in., being located by dowels which fit into holes in the body base. The back-rest frame consists of a rolled and beaded-edge aluminum panel, slightly curved, with three flutes to increase rigid-



7-hp. Austin chassis with complete body ready for mounting

ity. It is riveted to a one-piece channel section base pressed from 18 gage sheet steel.

Chassis construction also is somewhat unusual. The ordinary frame side members are displaced by two flanged channel units with the channels facing downward. Except for the engine-bearers, only the flanges are drilled at any point between the extremities of the two main frame members, which are straight and converge at the front. These channels are formed from 12 gage stock.

Spring Anchorage

At their front ends the main members are joined by a short casting which serves as the anchorage for the inverted semi-elliptic transverse spring. The same unit supports the starting crank, the center of a Hartford type shock absorber and an extension of the body carrying the radiator. Within the rear ends of the frame channels are bolted and clipped the butt ends of quarter-elliptic springs, the latter being supported under the axle casing immediately alongside the brake drums, thus giving a very wide rear support for the frame.

Straight transverse pressed steel channels join the two main members of the frame near their center and toward their rear ends. These cross members are riveted to the flange extensions of the main members and run underneath. The gusset plates at the rear end also serve as brackets for Hartford type shock absorbers, while the cross members extend at each side to support angle brackets which carry the body.

In addition to four of these brackets thus arranged outside the main frame members there are two near the center of the chassis under the steel front floor, to brace the latter where it is slotted to clear the top of the gear-set, the gear shaft and brake levers.

Apart from the lubrication system, there is nothing unorthodox about the engine. It is bolted at four points directly to the inverted channels of the frame. At 2400

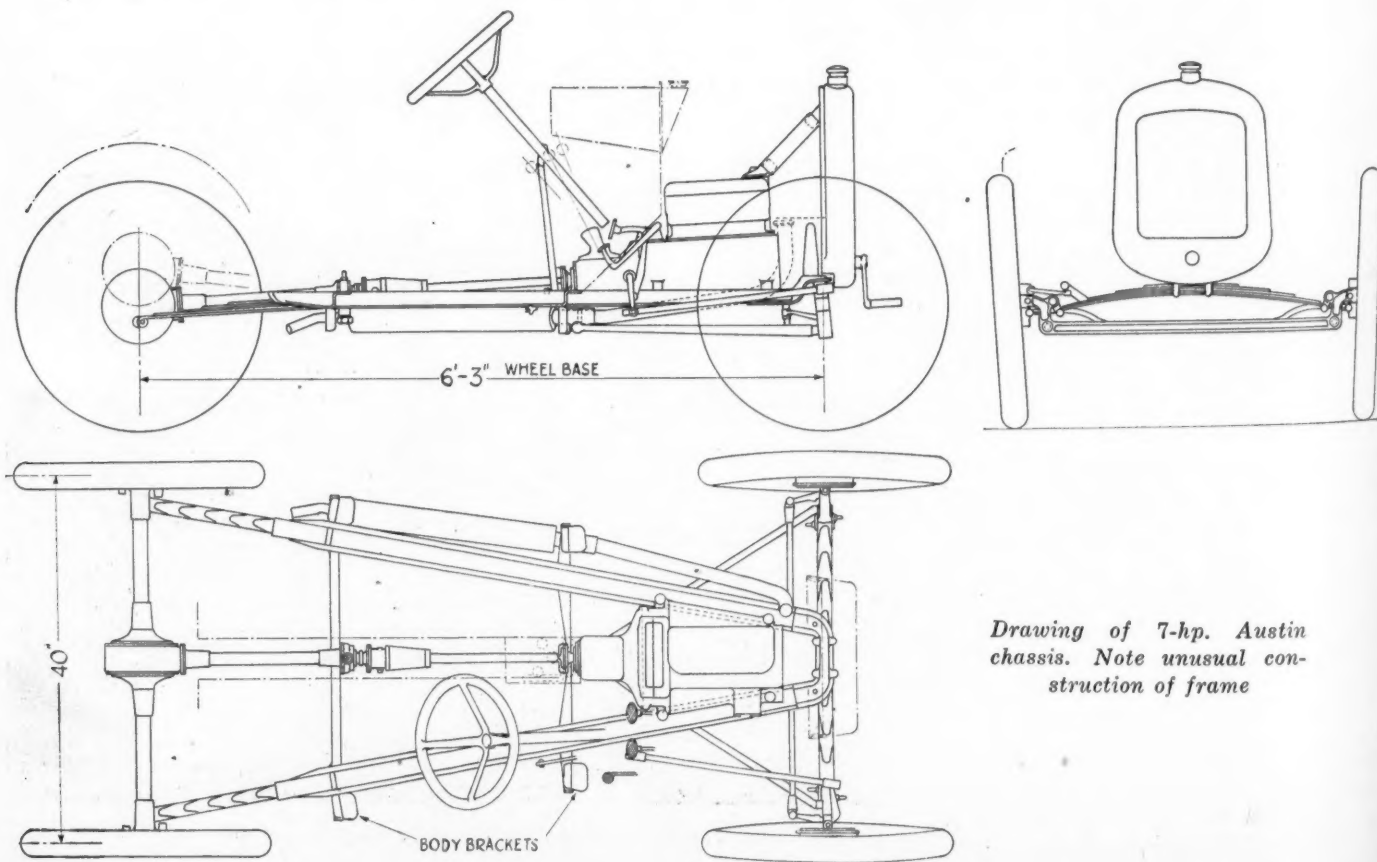
r.p.m. the engine is said to develop 10.5 hp., but the power curve is said still to run upward at 4000 r.p.m., while the engine will turn round at 5000 r.p.m., at which speed approximately 45 m.p.h. is attained on second gear—a maximum expected from every car during its road test.

It may be said that the way in which this miniature car runs is an eye-opener to everyone who rides in it for the first time. It has a wheelbase of only 75 in., track of 40 in., overall length of 106 in., overall width of 46 in., and weighs but 790 lb.; and yet even American visitors who have been taken for a run in the car over potholey roads have been astounded at its road-holding qualities, even at 40 to 50 m.p.h. Shock absorbers are not standard equipment, but are recommended where really bad roads are prevalent.

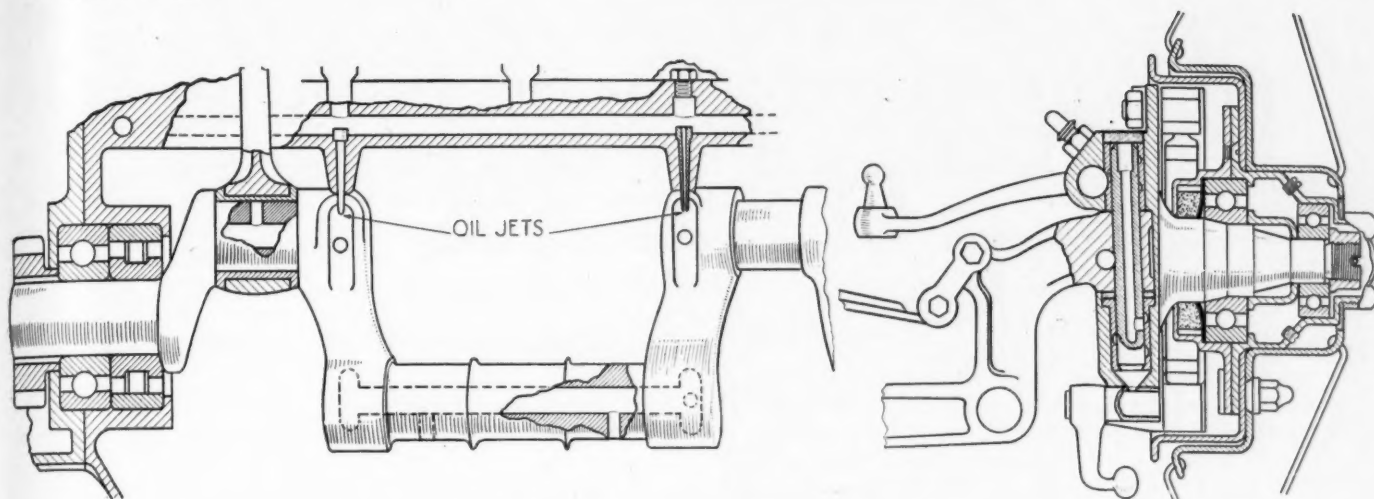
American observers have been impressed too by the fact that it is possible to use such light gage metal in the chassis frame and body construction and at the same time to secure sufficient rigidity and durability while also securing excellent riding qualities with a very short wheelbase. A part of the good riding qualities may be attributed to the three-point mounting of the chassis with a single transverse spring in front and two quarter-elliptic in the rear.

Lubricating System

Engine lubrication system comprises a pump feed to an integral passage running the full length of the crankcase, from which leads are taken to the camshaft bearings. The crankshaft runs on ball and roller bearings, but splash lubrication is not depended upon for the big ends. The shaft is hollow and oil is fed into it from two inverted nozzles fed from the longitudinal passage. Jets from these impinge upon four hollows or integral troughs in two of the crank cheeks and from those troughs the lubricant passes through holes drilled in the cheeks to the hollow core in the throws and all the big ends.



Drawing of 7-hp. Austin chassis. Note unusual construction of frame



Left—Detail of crankshaft and its lubricating system. Right—Detail of axle end, knuckle and front wheel brake

Magneto ignition is used and water circulation is by thermo-syphon action. Cylinders have a common detachable L-head. Engine, single-plate clutch and three-speed gearset are a unit construction on which the control pedal shaft is mounted. A fabric joint at the front end of an intermediate shaft carries the drive back to a square block universal at the head of the enclosed propeller shaft, the casing of which is supported by a swiveling joint with a bracket on the rearmost cross member of the frame.

Shaft and Rear Axle

The propeller shaft is formed integral with the helical bevel pinion and has a ball bearing at the front end as well as one against the pinion. A semi-floating rear axle is used. The steering is of the full worm-wheel type with a transverse drag link. It is provided with exterior means for adjusting the bearings of the column and the mesh of the worm wheel.

Front-wheel brakes are actuated by hand lever through one cable running from wheel to wheel after passing around an adjustable segment on the coupling bar of dual levers standing up from the hand lever shaft. Thence the cable runs forward diagonally. These brakes and also the rear ones—the latter pedal-actuated—are of the expanding type, front and back sets being interchangeable.

Steering pivot pins are not in alignment with the point of tire contact with the ground, nor are the levers on the brake camshafts precisely in line with the pivot pins, although the lever ends are bent at a right angle to a point almost under the pins. A direct diagonal pull is applied from cable to the brake camshaft lever and, although front brake application might be expected to exert a heavy pull or resistance to the steering, nothing serious in this way is felt by the driver. It is claimed that after two years' experience with this braking outfit in the hands of private motorists no cause has been found to adopt any variation.

Front brake adjustment is afforded by varying the position of the balancing segment on the hand lever shaft. Rear brakes, also cable-coupled, have a single wing-nut adjustment adjacent to the pedal. To absorb the torque reaction of the front brakes, a diagonal radius and torque member is used, the legs being of channel steel, tapered in section with the larger ends behind the axle and the smaller ends supported by a ball joint in a bracket attached to the front cross member of the frame. The lug attaching each front end to the axle is continued as a screwed (and nutted) stud which passes through the axle beam to carry the shackles of the front spring.

Detachable wire wheels have a three-nut attachment which also holds the brake drums in place, but neither the drive nor the torque reaction is taken by the nuts or the studs onto which the latter are screwed, for integral bosses on the brake drum engage with holes in the wheel hub.

Moreover, there is no need to remove the nuts to take off a wheel. Their stud holes in the wheel hub are clotted to connect them to the holes of larger diameter for the driving bosses, and a partial rotation of the wheel when the nuts are slackened enables it to be drawn off. A great point is made of the ease with which the brake drums also can be removed to enable the shoes to be inspected or the facings renewed, and for lubricating and cleaning purposes.

Each car completed is given a careful road test on a track with two test hills, too long to be rushed, one with a 25 per cent and the other a 17 per cent gradient, both within the boundaries of the site on which the plant is located.

All available space in the Austin plant not required for the production of "twelves" and "twenties" is being devoted to it, and yet the writer has been assured that both the home and foreign demand justifies a very considerable increase in the present output. The body is viewed as being, as it is in reality, a purely engineering proposition and therefore is produced on the engineering side of the plant, whereas the bodywork for the larger models, constructed at present on approximately orthodox lines, has a separate though adjacent plant devoted to it.

THE Starrett Book for Motor Machinists and Auto Repairmen is now off press. It forms Volume III of the Starrett books, the two other volumes being The Starrett Book for Machinists' Apprentices and the Starrett Data Book for Machinists. The present volume consists of over 200 pages 4½ x 7 in., attractively bound in artificial leather and into it has been gathered all the information and data which an automobile repairman would ever have occasion to meet. Constructions, reasons and uses are given of measuring tools, micrometers, files, hack saws, reamers, drills and a variety of other tools used in automobile repairing. A great deal of tabular material is included in the book, including drill speeds, screwthreads, tap drills, thread standards, keyways, grinding wheels, gages, etc. The book is copiously illustrated with line drawings, diagrams and sections. Considerable space is given to the subject of screw threads with complete data on all standards.

Front Wheel Drive Chassis Without Axles Is Developed for Bus Purposes

Complete powerplant, driving mechanism and most of braking system form detachable tractor unit. Trailer unit, which carries body, has very low stiff straight top frame and wheels mounted on radius arms.

AN extraordinary development in bus construction is embodied in the chassis of the Upperco coach designed and built by the Aeromarine Plane & Engine Co. of Keyport, N. J. This vehicle combines an easily detached tractor comprising a complete powerplant, front wheel driving mechanism, braking system and the equivalent of a front axle, with a trailer and body having an exceptionally low floor, yet there is nothing in the external appearance of the complete vehicle to suggest a separate arrangement.

Speaking in the ordinary sense, the tractor and the trailer units have no axles and the substitutes for these units in combination with the front wheel driving mechanism and a novel steering system constitute what unquestionably is one of the most unusual developments from an engineering standpoint which has been brought to light in the bus field for several years.

Starting with a clean slate and fewer commercial handicaps than are the lot of most engineers, Roland Chilton, who played a prominent part in the design of the original Fergus car, and his associates have made the most of their opportunities in producing a motor coach chassis which merits close study by all those interested in progressive developments in bus design. The long experience of W. H. Douglas, general manager of the Aeromarine Co., in the design of front wheel drive electric vehicles, many of which have been in service for over ten years, also has been used to good advantage.

Drawings of the bus and its component parts are not yet available, but from the accompanying sketches it will be seen how low center of gravity and frame, front wheel drive, a readily detachable tractor unit and a marked decrease in unsprung weight is attained.

Absence of the ordinary rear axle and of all driving mechanism under the floor of the vehicle permits the use

not only of an exceptionally low frame and floor, but makes it possible to avoid the use of a kickup at the rear. Floor boards are only 19 in. from the ground, and the side channels of the frame are 9 in. deep and absolutely straight, yet there is a ground clearance of 9 in. This design affords not only greater stability and safety but permits of lower overall height of body and makes for better appearance. In double-deck construction the upper deck is much lower than appears to be possible with a kicked up frame. The straight frame also renders body construction less expensive and helps to strengthen the body structure.

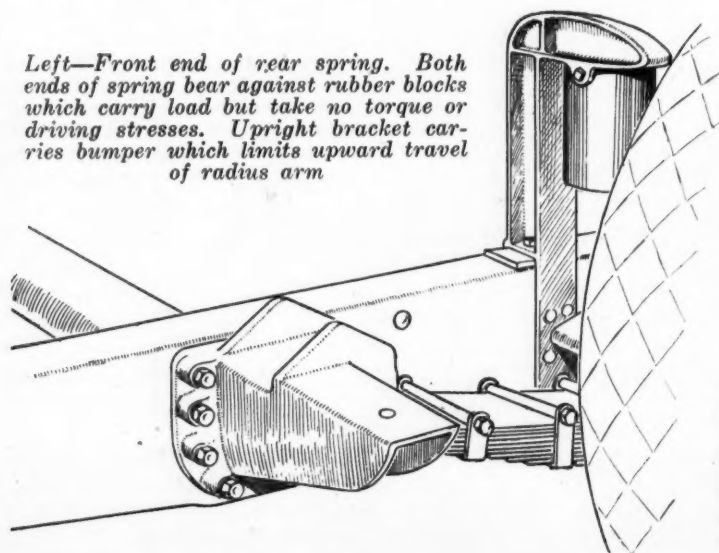
In this design the main frame ends at the dash and there is fastened to the main cross member of the tractor unit by two heavy bolts. These are relieved of shearing stress by a horizontal flat joint between two manganese bronze castings, one of which is riveted to the main frame, the other being a part of the girder cross member.

How Tractor Unit Is Disconnected

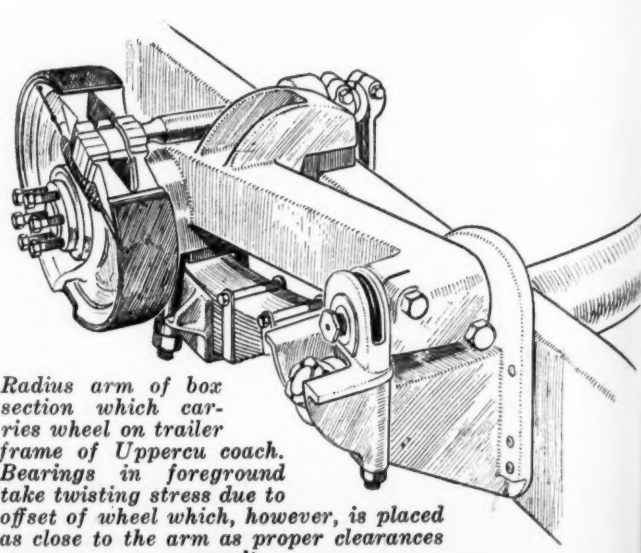
The other points of attachment of the tractor are at the rear ends of the tractor frame, which are bolted to the forward tubular cross member of the frame of the trailer. When the tractor is to be disconnected from the trailer, the front end of the latter is supported on jacks and the rear end of the trailer on a wheeled truck, the four attaching bolts removed, rear brake rod battery lead and exhaust connections detached, and the two units are rolled apart.

As will be seen from the sketches, the powerplant and all driving mechanism is a part of the tractor unit. This unit includes also the steering and braking mechanism, the dash and the driver's seat. Except for rear wheels and their brakes and supporting members, the tractor is a complete chassis in itself.

Left—Front end of rear spring. Both ends of spring bear against rubber blocks which carry load but take no torque or driving stresses. Upright bracket carries bumper which limits upward travel of radius arm

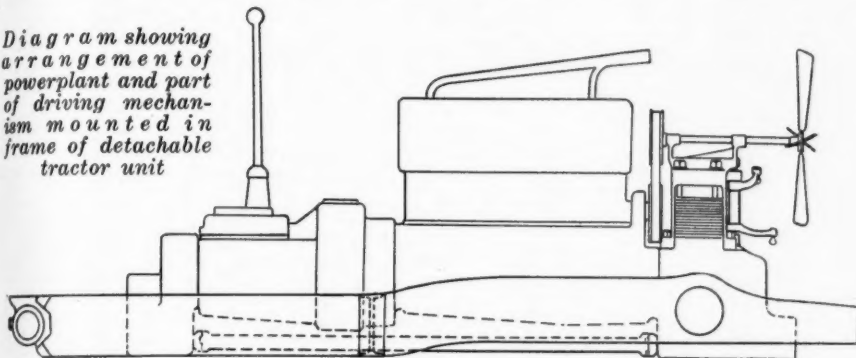


Radius arm of box section which carries wheel on trailer frame of Upperco coach. Bearings in foreground take twisting stress due to offset of wheel which, however, is placed as close to the arm as proper clearances permit



Power is furnished by a Type 6-B 3 $\frac{3}{4}$ x 5 in. six-cylinder Continental engine said to be capable of delivering 70 hp. continuously at 2200 r.p.m. This drives through a Brown-Lipe multiple disk clutch and a four-speed gearset of the same make to a silent chain which runs over two sprockets, one of which is mounted on the tail shaft of the gearset, where the propeller shaft ordinarily is connected, and the other on a separate shaft directly below. The latter, together with the chain, is housed in a separate case attached to the gearset case. On the rear end

Diagram showing arrangement of powerplant and part of driving mechanism mounted in frame of detachable tractor unit



of this sprocket shaft is a brake drum, while on the forward end is one-half of a positive clutch engaging with a similar member on the rear end of the propeller shaft.

In this case the propeller "shaft," in reality a thin walled tube, is nearly 3 in. in diameter and runs forward under the engine to an aluminum housing which is bolted up rigidly to the side channels of the tractor frame just ahead of the engine. In this housing is a standard Sheldon worm and gear with differential. The worm is underslung and is connected to the propeller shaft by a second jaw clutch identical to that on the rear end of the shaft. The gears give a reduction of 7.75 to 1.

Since the engine, gearset, chain case and worm gear housing are joined rigidly together, either directly or by the 9 in. side channels of the tractor, no universal joints are required in the propeller shaft, but the positive clutches permit the shaft to be removed easily when the shaft carrying the lower of the two sprockets is slid backward a distance corresponding to the length of the teeth in the clutches. This is accomplished by turning adjusting nuts provided for the purpose.

From the differential the drive is taken to each front wheel by a propeller shaft which has a single universal at its inner end and a double universal joint at the outer end and inside the live hub of the wheel. With front wheel drive and four-wheel brakes skidding tendencies are reduced and safety increased.

Front Wheel Joints Inside of Hub

Details of the joint construction inside the hub are not yet available for publication, but it may be said that the bearing surfaces are between bronze and hardened steel and are of such proportions as to give long life. Lubrication is by grease which fills the lower portion of the cavity in which the wheel joints operate.

It is stated by the makers that a test bus chassis has been run around in a circle for hours at a time under conditions of very heavy load artificially applied to determine whether any signs of failure in the joints occurred. It is asserted that none developed and that the temperature rise was very slight, showing that the power consumption is small.

The live wheel hub with which the universal joint is connected rotates in two exceptionally large anti-friction bearings, one a standard ball bearing which takes both thrust and radial loads, and the other a special straight

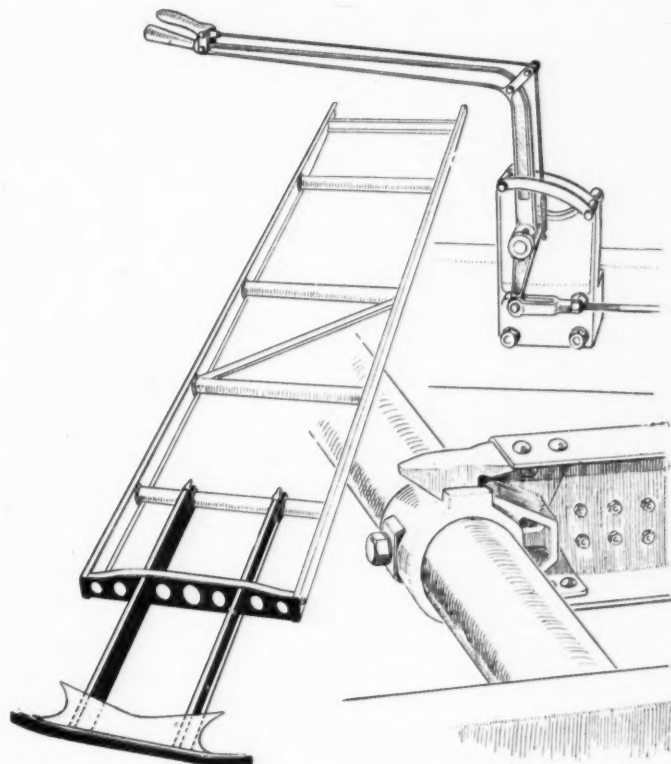
roller type. These bearings are carried inside a pot shaped manganese bronze casting which has integral trunnion bosses forming the knuckle pivots.

Knuckle pivot bearings are formed at the top by another casting attached to the outer end of the single 66 x 5 in. transverse spring which is anchored at its center above the worm gear case and is designed to bear the full weight of the front end of the vehicle. The bearing at the base of the casting is carried in a yoke pivoted about a horizontal fore and aft axis and joined to the frame of the tractor by an A-shaped radius member which takes driving and torque stresses.

Since the spring and the radius member are parallel and remain so under spring deflection, the angle which the plane of the wheel makes with the road does not vary, although under extreme deflection the wheel moves parallel to its axis about $\frac{1}{2}$ in. This motion, it is claimed, has absolutely no effect upon steering and, even though the knuckle pivot is inclined transversely to give approximate center point steering, there is said to be no tendency whatever to wheel

wobble or shimmy.

This is attributed to the novel and interesting layout of the steering system, which is wholly different from that on any other vehicle with which we are acquainted. A Ross steering gear is mounted outside the frame, but with the shaft which carries the steering arm projecting inwardly and the arm itself jointing straight up, with its end well above the top of the frame. From the ball on the end of this arm the drag link extends forward beside the engine to a point just forward of the front spring, where it is connected to a lever carried on a vertical shaft in the central plane of the chassis.



Frame structure used in Uppercu coach is shown at left, and one of the brackets for attaching the frame of the tractor to the main frame at the right. Tractor frame is shown in black and has same size side rails as main frame. Hand brake lever is shown above

This shaft rotates in bronze bearings and carries near its lower end two other levers joined by a turnbuckle which corresponds to the tierod in conventional construction and forms with the levers a triangle, the base of which can be varied by shortening or lengthening the buckle. On the outer ends of the two levers are balls each of which is connected by a drag link to a similar ball on the end of a lever attached to the wheel pot. This arrangement is shown clearly in an accompanying sketch.

It is interesting to note that the wheels are not toed in, although they are undergathered in the usual fashion. Of more importance, however, is the fact that the wheels can be moved through an arc of a full 53 deg., as against a maximum of about 45 deg. in the usual design. On this account a chassis with 220 in. wheelbase can be turned about in a 50 ft. street without backing. The actual turning radius is 28 ft. This naturally is of considerable importance where city operation is involved. Short turning is said to be made feasible and altogether safe where front wheel drive is employed.

In attaining this unusual steering lock advantage is taken of the fact that the inner wheel turns through an arc of about 10 deg. more than the outer wheel. In consequence the propeller shafts which drive the front wheel instead of being set at right angles to the chassis are raked back 5 deg., bisecting the 10 deg. angle mentioned. The propeller shafts are completely inclosed, but the design is such that they can be removed without taking off a wheel, opening the worm gear housing or even jacking up the chassis.

Another feature of interest in the tractor design is the Simplex air brake, operated by manifold vacuum. The control member for this brake is arranged to slide along the hollow piston rod, covering and uncovering a port which controls the flow of air from the vacuum cylinders, thus putting a pull on the brake rod approximately proportional to the amount the valve is moved by the brake pedal. There are four cylinders in series and they are capable of exerting a total pull of over 1200 lb. on the brake rod.

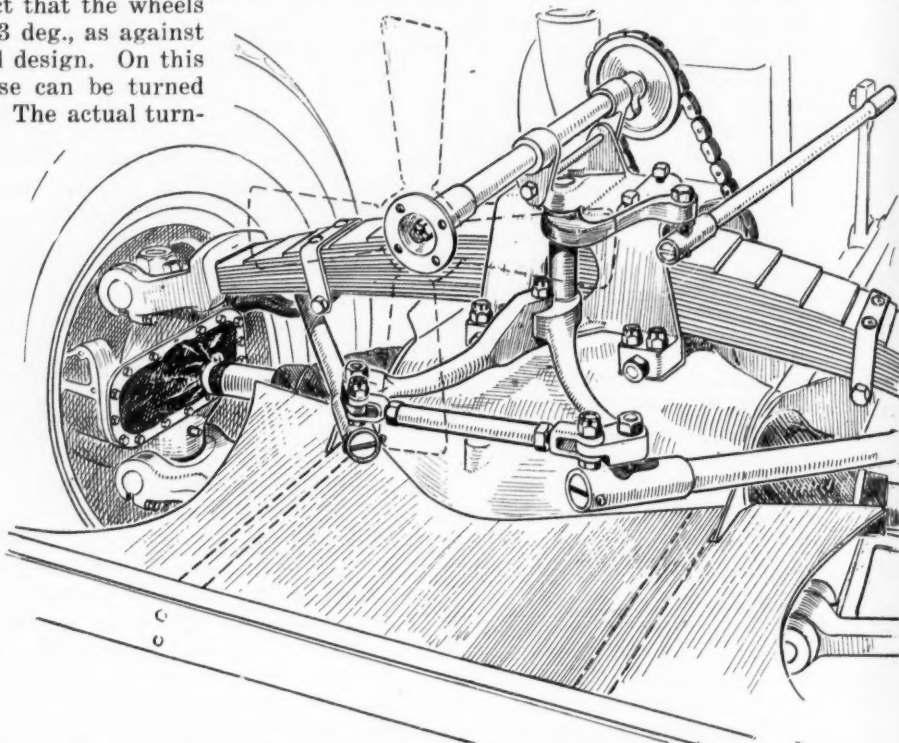
The vacuum controlled pistons are so connected as to operate all brakes simultaneously. If, however, the power brake fails to function, further motion of the pedal applies the brakes mechanically. It is worthy of note that braking is done on all four wheels, that on the front wheels being equalized through the differential.

Primary interest in the trailer unit centers about the substitute for a rear axle. With so low a frame it was not feasible to use an underslung axle, while a kickup has disadvantages cited above. The alternative selected was to mount the rear wheels on radius members of heavy box section and attach the 60 x 4 in. spring to the hub end of this member. As will be seen from the accompanying sketch, this radius arm is subjected to a heavy torsional stress, but it is designed accordingly. The order of magnitude of the stress is said to be about the same as that in an ordinary form of rear axle, but the unsprung weight, it is claimed, is reduced to a marked degree.

Bearings forming the radius rod hinge are spaced about 12 in. apart and supported on aluminum brackets reinforced by steel bolts and a steel truss rod take the torsional stress and transmit it to the frame which is

reinforced at this point by one of the four large tubular transverse frame members. This, in common with the other three tubular cross members, is attached to the side channels by flanges of manganese bronze which are cast on the ends of the tube after the latter is drilled radially to permit the metal to flow into the holes and thus give great torsional strength at the joint.

No spring shackles are employed in this vehicle. One end of the rear spring bears against a rubber block mounted in a frame bracket, while the other rests on a similar block near the forward pivot of the radius arm.



Front end of Uppercu tractor unit, showing single transverse spring, which supports whole forward portion of complete vehicle, universals and worm gear case forming part of front wheel drive, part of hinged radius brackets attached to lower part of knuckle and parts of the novel steering system

Since with this arrangement neither torsional nor driving stresses are taken by the spring or its supports, a plain cubical block of rubber is said to meet all requirements. Arrangement of the stops which limit the motion of the radius arm is shown in the sketch. It should be noted that either front or rear wheel on one side of the vehicle can surmount a considerable obstacle without affecting the wheel on the opposite side.

Pressed steel outriggers on the frame, together with the brackets for spring and radius arm, support the body.

Space limitations prevent giving many details concerning the bodies which are built by Healey & Co. A feature of the single-deck body is the double-door at the front, forward half used for entrance and the other for exit. The driver's seat is elevated. Bodies are made largely from wood, but have metal panels and a monitor type roof. Weight of chassis and 30-passenger single deck body is given as 11,000 lb.

Double-deck bodies are said to measure only 11 ft. 1 in. from ground to top of guard rail, although they have 76 in. headroom on the aisle inside. This is made possible by locating the seats on the upper deck 8 in. lower than the aisle. Thirty-two passengers are seated on the lower deck and 34 outside.

Single deck buses have 38 x 9 in. pneumatics on all wheels, while double-deckers have the same size pneumatics in front with solids on rear. Wheels are disk type and are made by the Aeromarine Co.

Just Among Ourselves

What's New Under the Sun?

PERSONALLY we haven't been in the automobile industry for twenty-five years and once we were inclined to listen a little bit skeptically to some of the sagas of bygone days that have been inspired recently by the approach of the Silver Anniversary of the automobile business. We have had to become hardened to having our wonderful new ideas constantly met with "Why, that was first discussed back in 1899." So we thought we had better look into history a little more closely to find out where we got off. Well, we did get off!

Same Ideas with Modern Improvements

STARTING right at home with Vol. 1, No. 1 of *The Automobile*, the direct ancestor of AUTOMOTIVE INDUSTRIES, and following through the first few issues of that publication, we found that nearly every problem we discuss so learnedly today already was having the cold rays of analysis fixed upon it back in October, November and December, 1899. Our illustrious forbear at that time was telling of exhibits at the Paris Show, just as we did last week; about new bodies, accidents, headlights, new models, the future of the business, good roads, licensing vehicle operators, traffic congestion, buses, and races. Moreover, a world survey of automobile registrations and activities was made about that time. Production methods and dealer relations are about the only really new topics which are before the industry today. The old problems have changed somewhat; different answers are being given to suit different conditions. But basically the subjects are the same. Automobile men were thinking about building up the

industry as a whole as well as of specific mechanical problems.

Complete Insurance Coverage for \$15

AND most of the ideas expressed by the executives who built the industry were just as forward-looking and just as progressive as they are today. Some of the ideas which appeared before the beginning of the present century and shortly after are certain to bring a whimsical smile to the modern executive, but he cannot but respect the vision shown by the early leaders despite the relatively small group of facts they had available on which to base conclusions. But ideas change and the industry continues to progress. Sometimes one may well wish that they didn't change quite so much when one reads in *Horseless Age* of 1899 that a New York insurance company had just undertaken a new line of business—insurance for automobile owners and that "it insures owners of motor vehicles against loss by litigation for a period of one year for the sum of \$15." Them was the happy days!

Large? Well, "Yes" and "No"

IT didn't take so much expenditure to get recognition in those days as is evidenced by another item headed "Large Factory at Detroit." The article told of plans for a new plant of the Olds Company which was to be erected on a plot of ground "fronting 195 ft. on Jefferson Avenue and running back over 1,000 ft. to the river."

Horses, Horseflies and Automobiles

WE still are thinking up new arguments in favor of motor vehicle use, but it remained for

one of these old file copies to give one that is new to us, namely, that the use of motor vehicles would reduce the number of stables and thus eliminate the swarms of flies which often annoyed people living near to such places. The horse vs. motor car argument was quite hot in those days, but there were those who believed in cooperation even at that time. One conciliator drew up a design of motor phaeton which embodied use of the head and shoulders of a stuffed horse protruding from the dashboard. His idea was that "it would have all the appearance of a horse and carriage and hence raise no fears in any skittish animal."

San Francisco Trip Discouraged by Industry

ONCE in a while an unprogressive note was struck in the old days, just as in present times, however hard we try to look ahead. An editorial appearing in 1899, for instance, made the following comment on a "San Francisco or bust" tour which had started from New York and which was busting many times along the way. "If the unfortunate experiences of this couple shall do anything to discourage similar enterprises in the future their troubles will not have been wholly in vain. An immediate termination of the journey would be welcome to the motor vehicle industry of the United States."

But on the whole progressive thinking was in an overwhelming majority in the early days and as a result one of the greatest industries in the world has been built in a quarter of a century. If someone twenty-five years hence can write as favorably of us who are in the ring today as we are bound to write of those of the 1900 era our best efforts will be necessary in our years of activity. N. G. S.

Exhaust Gas Analysis Shows Charge Distributed to Each Cylinder

Method for determining fuel-air ratio of charges delivered to individual cylinders of a multi-cylindrical engine devised by Pittsburgh Station, Bureau of Mines. Portable apparatus used.

A GOOD deal of work has been done by the Pittsburgh Experiment Station of the Bureau of Mines in connection with the analysis of the exhaust gases of internal combustion engines. Originally, it seems, the object was to find out what was required in the way of ventilation in tunnels for motor vehicle traffic, but later the valuable data gathered was turned to further account by impressing upon motor vehicle operators the great waste of fuel that occurs if their carbureters are improperly adjusted. The Bureau has now gone one step further and applied the method of exhaust gas analysis developed by it to an investigation of distribution problems in connection with multi-cylinder engines.

The use of exhaust gas analysis apparatus for this purpose is described in a report by G. W. Jones, W. P. Yant and L. B. Berger, associate chemical technologist, assistant chemist and laboratory assistant, respectively, of the station, from which the following is taken.

The distribution of a gas mixture of non-varying composition to the different cylinders, especially with engines having six or more cylinders, depends mainly upon the design and shape of the intake manifold, the carbureter, and grade of gasoline used.

The present method generally employed to determine distribution is to enrich the mixture fed to the engine until one or more cylinders begin to misfire. This indi-

cates those cylinders that are running "rich." Then the mixture is "leaned" until misfiring again begins, which indicates those that are lean. In a way this method is satisfactory, but unless the ignition is perfect, misleading results will be obtained.

Nature of Exhaust Gas

Automobile exhaust gas is a complex mixture of gases consisting mainly of carbon dioxide (CO_2), carbon monoxide (CO), oxygen (O_2), methane (CH_4), hydrogen (H_2), and nitrogen (N_2), and at times gasoline vapor and traces of unsaturated hydrocarbons. A complete analysis of the gas requires the services of an experienced gas chemist and a rather complicated apparatus. However, for the determination of distribution, a complete analysis of the exhaust is not necessary. All that is required is the percentage of carbon dioxide in the exhaust and the total carbon dioxide in the gas after the sample is burned in a slow-combustion pipette. The apparatus for making this determination consists only of a 100-cc. measuring burette, a caustic pipette, and a slow-combustion pipette as shown in Fig. 1. It is easy to manipulate, and dependable results may be obtained by an unskilled technician. The method is based on the following considerations.

The average gasoline on the market at the present time contains approximately 85 per cent of carbon by weight. As far as determining the gas distribution is concerned, the actual carbon content has no significance and need not be known; but in the discussion which follows and in reading Fig. 2 for determining the air-fuel ratios, gasoline of this composition was used.

To determine the total percentage of carbon-containing gases it is only necessary to burn a sample of the exhaust gas with an excess of air whereby the gases are all converted to carbon dioxide, and then determine the percentage of carbon dioxide present.

Additional valuable information is obtained if the carbon dioxide present in the samples is determined before the slow combustion is made. Although it is not absolutely essential for determining engine distribution, it gives directly the air-fuel ratio of the test by referring to Fig. 2.

Fig. 3 shows a convenient method of taking samples from the cylinders of an internal-combustion engine. Here, a four-cylinder engine is being tested, an individual copper tube being run to the exhaust from each cylinder. These tubes are affixed by drilling holes in the exhaust manifold, and tapping them to receive short $\frac{3}{8}$ -in. pipe nipples. These nipples are closed by pipe caps which are drilled to receive the $\frac{5}{16}$ in. copper tubing through which the samples are taken. Asbestos is placed inside the cap and around the tubing, and when screwed on the nipple a gas-tight joint is made. Ordinary solder cannot be used on the tubes, on account of the high temperature. If soldering is done, silver solder should be used. The copper tubes connect with glass tees *e*, and then by means of

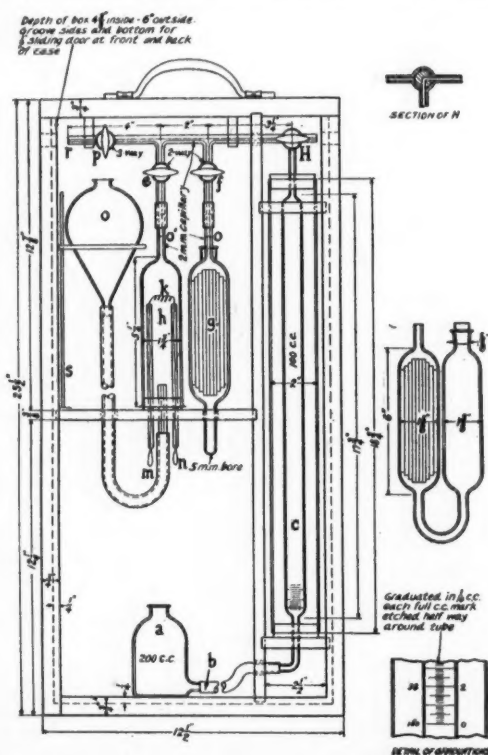


Fig. 1—Portable apparatus for analyzing exhaust gases

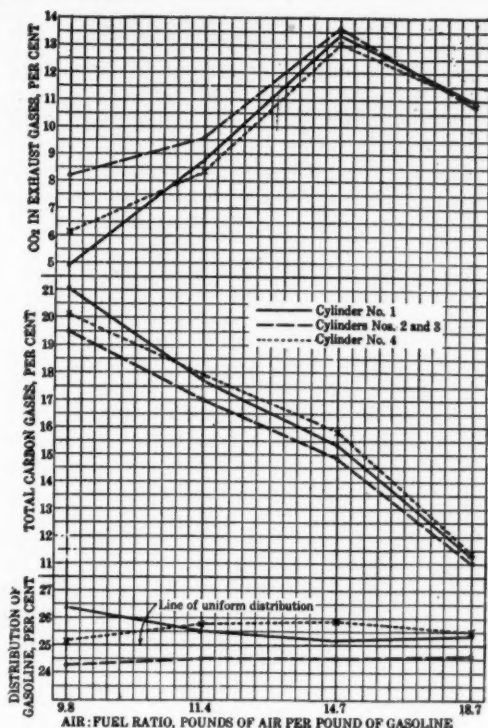


Fig. 2—Chart showing result of tests made on a four-cylinder engine to determine gas distribution. Tests made at varying air-fuel ratios and maximum load

rubber tubes to the water seal *g*. Gas sampling tubes *f* filled with water saturated with exhaust gas, are connected with the lower branches of the tees, as shown. With the engine operating at the desired speed and load, the clamps on the four sampling tubes are opened, and samples of the exhaust from the different cylinders are taken for analysis.

An apparatus similar to that shown in Fig. 1 is used for making the analysis. A 100-cc. burette, a caustic pipette, and a slow-combustion pipette using mercury, and necessary connections constitute the main essentials of the apparatus. Water saturated with exhaust gas is used as the confining liquid in burette *c*, caustic soda (20 grams of sodium hydroxide to 10 cc. of water) is used in pipette *g*, and mercury in pipette *k*.

Method of Procedure

Briefly the procedure of analysis is as follows: Cock *e* is removed and mercury poured into *d* until it rises to the level *o'* then cock *e* is replaced. Pipette *g* is filled slightly over one-half full of caustic, it being introduced through the rear branch of the pipette with cock *f* removed. Cock *f* is then replaced. About 200 cc. of water saturated with the exhaust gas is poured into leveling bottle *a*. To prepare the apparatus for analysis, cock *H* is turned to the position shown in section at the side, and cock *p* closed, leveling bottle *a* is raised until water flows out at *H*, then *H* is turned 90 deg. clockwise connecting with the manifold. Cock *f* is opened and *a* lowered until the caustic solution is drawn to the mark *o*, then cock *f* is closed. In a similar manner the mercury level in combustion pipette *h* is brought to the level *o'*. The apparatus is now ready for use.

A sample of the exhaust gas taken as previously described is connected to the left hand branch of the manifold leading to the pipettes, *H* is turned to connect to the outside air and *a* raised until water flows out at *H*, then *H* is turned to connect with the manifold and cock *p* opened to the sample; *a* is lowered, drawing into the

burette a sample of the gas. This sample contains some air from the capillaries and should be discarded by opening *H* again to the outside air and raising *a* until water again flows out at *H*. Again turn *H* to connect with the manifold and the sample, and lower *a* drawing in a sample of gas until the water level in the burette falls around the 50 cc. mark and close *p*. Allow the burette to drain 30 seconds and read the volume of gas taken for analysis by bringing the level of the water in the burette and bottle *a* to the same height. Then raise *a* and open *f* and pass the gas into the caustic pipette *g*. Pass back and forth, in and out, of the caustic pipette by raising and lowering *a* five or more times. Lower *a* carefully until the level of the caustic solution comes to the mark *o*, then close *f* and read the volume of the gas in the burette after the former manner.

What Difference Between Readings Shows

The difference of these two readings when divided by the volume of sample taken and multiplied by 100 gives the per cent of CO₂ present in the sample. Leveling bottle *a* is then lowered and *H* turned to connect with the outside air and air drawn into the burette until the total volume equals about 95 cc. It is not necessary to read this volume. The gas is then passed into combustion pipette *h* by opening *e* and raising *a* and lowering leveling bottle *O*. The platinum wire *k* is then heated to a bright yellow by connecting four dry cells in series to the electrode connections *m* and *n* and the wire heated for 2 min. The gas is passed back and forth several times over the glow-

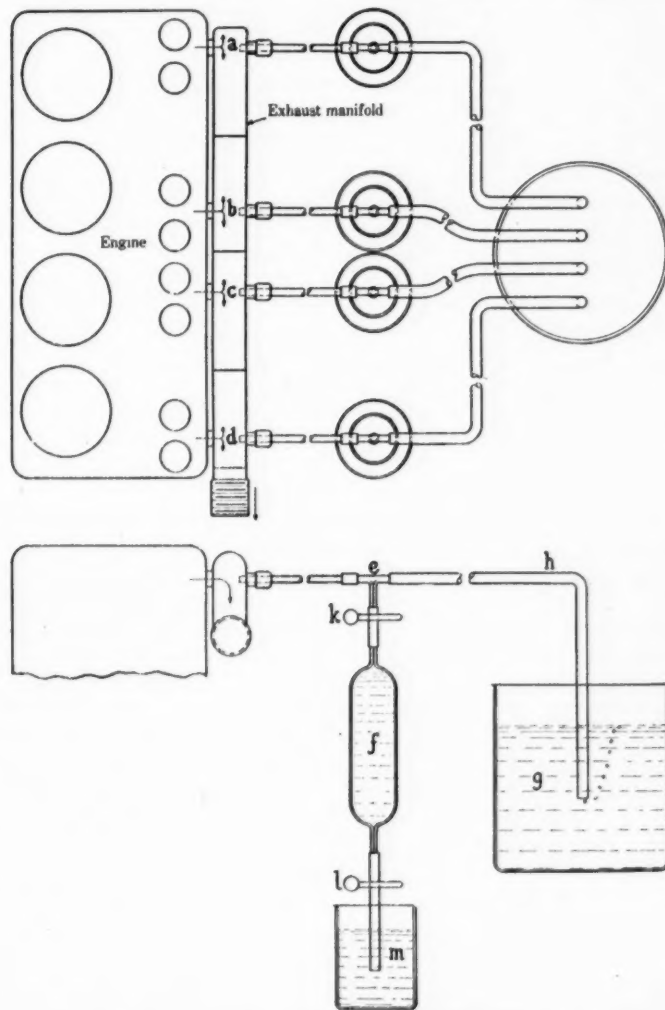


Fig. 3—Apparatus for taking exhaust gas samples from individual cylinders

ing wire to hasten the combustion. The current is then turned off and the pipette allowed to cool. This can be hastened by placing a pad of cotton waste soaked in water around the top of the pipette before burning.

The gas is then drawn back into the burette by lowering *a* and raising *O* until the mercury reaches the mark *o'* and closing cock *e*. The volume of gas is then measured in the usual manner, after which it is passed into the caustic pipette and the carbon dioxide produced by the combustion removed. The gas is then withdrawn into the burette and measured. The difference of these last two readings gives the volumes of CO₂ produced which when added to first CO₂ volume found gives the total volume of carbon-containing gases in the sample. This value when

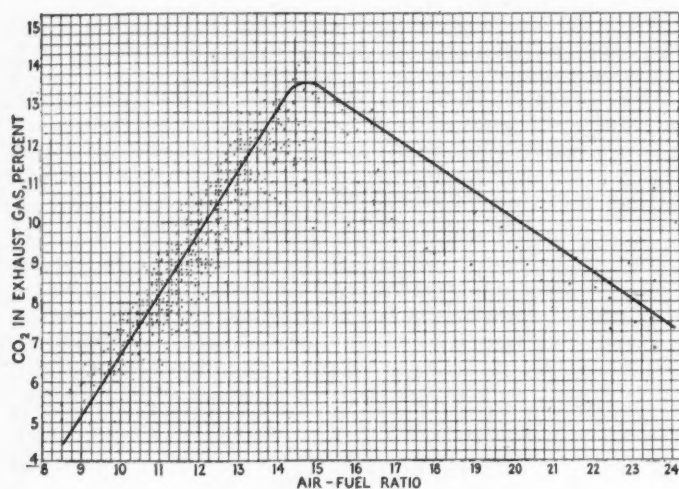


Fig. 4—Graph showing relation between percentage of CO₂ in exhaust gases and air-fuel ratio, based on experimental determinations

divided by the original volume of sample taken and multiplied by 100 gives the total percentage of carbon-containing gases. A typical example of the method follows:

		Difference	Per Cent
Volume of sample taken.....	52.80 cc.
Volume after CO ₂ removal....	48.50	4.30	8.1
Air added—volume not recorded			
Volume after burning.....	84.97
Volume after CO ₂ removal....	79.30	5.67	10.8
Total per cent of carbon-containing gases		9.97	18.9

To show the application of this method, a series of tests was made on a four-cylinder engine connected to a dynamometer in the laboratory. This engine had been used for some time for studying problems pertaining to the efficiency of combustion of different classes of fuels, and was known to give fairly good distribution with the fuel used, a low-test gasoline sold in the Pittsburgh, Pa., district. All tests were made at an engine speed of 1000 r.p.m. and at from 75 to 80 per cent load. The two middle cylinders discharged into the same exhaust outlet, so that one sample of gas was taken from these two cylinders. Tests were made at several different air-fuel ratios, and results are plotted in Fig. 4. These results show that at the low air-fuel ratios or rich carburetor adjustments there is considerable variation in the distribution, but as the air-fuel ratio increases, the distribution to the different cylinders becomes practically the same for all cylinders.

To determine the distribution under actual road conditions a four-cylinder, 22.5 hp. engine was tested at two speeds, and samples were taken simultaneously from the different cylinders. The results are not intended to

cover the whole question of distribution with this engine, but rather to show a typical example of how the method can be applied. To make a thorough study of the engine it would have been necessary to make tests at varying speeds, varying carburetor adjustments, on the level, up and down grades, and with different classes of fuel. The following table gives results obtained when the engine was tested at 15 and 30 m.p.h. up a 4 per cent grade:

Results of Gas Analysis Showing Distribution of Fuel to the Cylinders of an Engine Tested Under Road Conditions

Cylinder No.	CO ₂ in Exhaust, Per Cent	Air Fuel, Ratio	Total Carbon Contain- ing Cases, Per Cent	Distribu- tion, Per Cent	Excess or Deficiency Which Each Cylinder Received, Per Cent
Tested at 15 miles per hour up 4 per cent grade					
1.....	8.1	10.9	18.9	28.5	+14.0
2.....	8.4	11.1	18.2	27.4	+ 9.6
3.....	12.0	13.5	14.5	21.8	-12.8
4.....	11.6	13.3	14.8	22.3	-10.8
Average..	10.0	12.2	16.6
Tested at 30 miles per hour up 4 per cent grade					
1.....	9.0	11.5	18.0	27.2	+ 8.8
2.....	9.5	11.9	17.6	26.6	+ 6.4
3.....	11.4	13.1	15.3	23.2	- 7.2
4.....	11.9	13.4	15.2	23.0	- 8.0
Average..	10.4	12.5	16.5

These tests clearly show that cylinder No. 1 (the front cylinder) at 15 m.p.h. receives 14.0 per cent more, the second 9.6 per cent more, the third 12.8 per cent less, and the fourth 10.8 per cent, less, than it should. At 30 m.p.h. the variation is not so great; yet the "loading up" of the two front cylinders is clearly indicated while the two back cylinders are receiving too lean a mixture.

It is impossible with the engine tested to adjust the carburetor to give a very economical mixture, due to the fact that should such an adjustment be attempted, two of the cylinders would be so lean that engine trouble would be almost sure to develop.

IN France, when some new technical difficulty arises in the development of any industry, or as a result thereof, they organize a competition and offer prizes for the most promising "solutions." This focuses attention on the difficulty and sets many inventively inclined minds to work upon the problem.

Of late the city of Paris has suffered greatly through the rapid wear and destruction of its street pavements, and the trouble has been found to be due to the jolting of the motor buses, which in Paris still run on solid rubber tires.

Equipment with pneumatic tires might solve the difficulty, and a few buses actually have been thus equipped, but the bus services are a municipal enterprise and the city engineers are not convinced that the extra cost of pneumatic equipment is warranted by the results.

Elimination of jounces and jolts is highly desirable, not merely because of the resulting saving on road pavements, but the administration is not convinced that the use of pneumatic tires is the most economical method of eliminating the jolts, and so it is organizing a prize competition for shock absorbers for vehicles weighing 2 tons and more with load. It is understood that the objection of the Council to pneumatics is not based solely on their greater cost, but also upon the factor of uncertainty which they would introduce into the service.

The magnitude of the problem confronting the French capital may be judged from the fact that a sum of 560 million francs has been budgeted for street paving purposes, to be spent during a period of ten years.

Profits in the Parts Business—

What Can Be Done About It?

Stability of manufacturing schedules is more important than inflated volume created by unprofitable equipment orders. Price scales and the closing of non-paying plants considered.

By Norman G. Shidle

"VOLUME output actually reduces overhead costs only when it is constant, so that a large part of the factory can be kept in operation at all times."

This statement was made the other day by a prominent parts maker. It sums up clearly the whole story of profits vs. volume from the standpoint of the automotive parts and accessory industry. It states a truth that has been forgotten many times by those who build parts.

More than one manufacturer has been known to seek orders which he knew would not yield him a profit and it has been common practice to expect replacement orders to bear the burden of profitless sales for original equipment made to vehicle manufacturers. There are reasons for this state of affairs—some of them good. But nearly everybody concerned knows about them by this time. The present question is, "What are we going to do about it?" rather than "What is the trouble?"

The latter question was analyzed in AUTOMOTIVE INDUSTRIES of June 19 under the heading, "Why Shouldn't We Pay More for Parts?" In that article it was shown that the chief reasons for low-priced sales of original equipment were three in number:

1. Advertising value resulting from use of parts as original equipment.
2. Desire to reduce overhead costs by increasing volume.
3. Desire to increase ultimate market for parts through decreasing cost of vehicle and thus increasing its market.

It was shown also that each of these factors has been overemphasized grossly in the past and that they do not further profit-making to anything like the extent that many executives seem to have believed.

But how can parts makers increase profits?

The answer must be different in nearly every plant. Success achieved by certain manufacturers and plans being made by others, however, should be helpful guides.

Volume May Not Mean Profit

To begin with, the idea that large volume necessarily results in large profits must be put aside. It doesn't. Plenty of balance sheets prove this latter assertion.

When a plant has a capacity much larger than the present demand for its product, one of three things should be done: Sales should be increased; part of the plant should be diverted to the manufacture of some product for which there is a greater demand; or, part of the buildings and equipment should be closed and sold to the highest bidder. Timken-Detroit Axle Co. adopted the last of these expedients when their Wilson Avenue plant failed to show a profit over a considerable period of time and when their market analyses indicated that it would be difficult in the future to manufacture at a profit the particular axle types made in that plant.

To some people the closing down of part of a factory seems like a confession of failure and for that reason they

continue operations long after profits have faded away. To the long-visioned business man, however, shutting down of an unprofitable part of a successful venture is a sign of good common sense rather than of weakness.

One of the most prominent unit parts makers is looking about among allied industries for a place in which to dispose of the products of his excess capacity. He declares that within a short time he expects to build up a business on the outside which will compare favorably with that done within the automotive industry. This company expects many other parts makers to follow its example. Though this particular organization plans to maintain its position as a specialist in automotive manufacturing, it feels that the situation demands outside sales as well.

Prices of Parts

Another road to profits lies through more frank statement of facts and through a stronger presentation of the parts makers' problem when sales of original equipment are being made. At least, this is the opinion of several strong parts builders. How far a parts maker can go in telling his customers what they will have to pay for his product and how strictly they will have to live up to a contract once made, depends, of course, almost entirely on who is the parts maker and who is the car manufacturer. Some of the stronger manufacturers in the parts field, however, have come to a point where they have made up their minds to get a profit out of original equipment business or refrain from doing any.

One company, for example, is about to ask of its car company customers that the latter supply regularly detailed production and sales figures so that the manufacturing schedule in the parts plant may be set on an intelligent basis from week to week. Executives of this organization feel that they are entitled to a fair chance of operating their factory efficiently and that they have not had such a chance in the past because of the constant and wide fluctuations in demand from customers who previously had contracted for fixed amounts each month. The plan of this organization is to demand all the information necessary to determine at any given time the sales position and probable needs of their customers.

They may attempt as well to write into their sales contract different prices for different quantities of units bought. Thus, when a car manufacturer who has contracted for 1000 units a month suddenly cancels shipment of 500 for the coming 30 days, his price on the remaining 500 automatically goes up.

These plans seem bold, but the company considering the experiment is well able to stand the shock of any difficulties which may be involved. Their product is a good one and their business in other lines is larger than in the automotive field.

As a matter of fact, any attempt to stabilize parts pro-

duction schedules should meet with hearty cooperation from those car manufacturers who are seeking real prosperity for the industry. Stabilized production schedules in parts plants invariably tend to reduce the cost of the units manufactured.

Many parts organizations have found it impossible to stabilize their schedules on the basis of such information as they now have. Cancellations often have been very sudden and demands for units just as unexpected. The car manufacturer has to pay for all of these sudden rises and falls in parts production schedules. If he can help to make them more nearly level by supplying information which ordinarily he would keep to himself, he will perform a constructive service by doing so.

Orders and Accepted Deliveries

Confidential reports indicate that at least one very large car manufacturing organization is going to make a strenuous effort to take all of the parts which it orders at the times specified in the original contract. This company plans to change its purchasing methods so as to establish a definite contractual relation which will be lived up to at any cost.

Under the new purchasing form, this company will outline its requirements in all departments for the coming year as accurately as possible. Then it will discount this conservative estimate by 15 per cent. Its business is to be placed on a basis of 85 per cent of its most accurate approximation. With this basis for purchasing, it will be possible easily to take everything contracted for.

Parts and material makers who have been consulted as to the practicality of the plan have indorsed it heartily.

It is much easier for a parts maker suddenly to increase his operations 15 per cent than to proceed with the manufacture of units according to contract and find the car maker unable to take them.

This manufacturer feels that the good will of the parts maker or material maker is worth any slight discommodity in taking the contracted deliveries, and that the day has passed when any producer can afford to neglect the good will of its supply sources.

Purchasing on a basis of this kind requires rather definite knowledge of future sales possibilities, a knowledge which varies with different car makers. The plan in general, however, must be considered a definite step in the right direction.

Friction between buyer and seller increases the cost of doing business and thus is helpful to neither. The greater the cooperation between car manufacturers and parts makers the lower will be marketing and production expenses.

Some car manufacturers recognize these facts quite clearly and make a point of "playing the game" with their supply makers just as much as possible. A parts maker says that one of his best customers always asks before a contract is signed, "Are you going to make a profit on this business?" Naturally, such a policy gets a favorable reaction from the parts manufacturer and probably assures that particular manufacturer of a few extra favors when demand reaches a peak and parts orders are difficult to fill.

The advantage of stable supply sources is growing more important each year. An interesting comment on one angle of this situation came to us the other day from an independent engineer. He wrote:

"How about the independent automobile manufacturer who buys parts and supports the parts manufacturer who is a subsidiary of a parent corporation making one or more automobiles? It would be very interesting to analyze this question from the economic point of view.

"The independent automobile manufacturer can easily

play against each other the independent parts manufacturer and the one who belongs to a family of parts and automobile companies.

"The subsidiary parts maker is really a department of the parent company and makes parts for the parent company or its various divisions as the case may be. He can sell to them at a profit but charge them no overhead, and if he succeeds in making the independent automobile maker carry his overhead he is in a very strong position as compared to the independent parts maker. Further, if the independent automobile manufacturer were to wake up some day and find no independent parts makers or only poor ones to whom he could go, he probably would not fare very well.

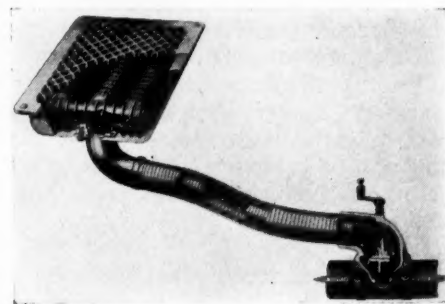
"He may find that he has been boosting the profits on the consolidated profit and loss sheet of his competitors and that he also has been killing the independent parts maker."

This point of view contains some interesting food for thought. It must be remembered, however, that the difficulties of coordination and supervision in large organizations are great. Consequently, an apparently sound economic theory may not work out in practice because of the difficulty of making a great number of organizations function with perfect efficiency as a single unit.

The car manufacturer can do a good bit to enable the parts industry to cut its selling cost. He should find it worth while because of the lower prices certain to result in the long run from the elimination of waste and inefficiency.

Keen competition for business, for example, has led many parts companies to offer considerable free service to manufacturers in the way of making up designs, estimating tool costs, etc. Because it is free, this service has been abused by some manufacturers just as free service in repair shops often has been abused by the public. Such abuse may accrue to the benefit of a particular manufacturer for the time being, but it generates waste in the industry and probably does not benefit even the individual in the long run.

Noble Heater Changes Hands



THE Noble Heater which was formerly manufactured by the Noble Heater Co. of Fort Wayne, Ind., is now being manufactured by the Gladiator Mfg. Co. of Auburn, Ind. The heater is said to have 95 per cent heat efficiency and is approved by the Underwriters' Laboratories. Insulation is obtained by means of a double walled, flexible metal tube which connects the valve on the exhaust pipe with the heater casting under the floor plate. Gases are deflected into the inner tube where they pass through the coils of the heater and return through the outer tube to the exhaust pipe. The valve is so designed that only four sizes are required to fit 90 per cent of all cars, ranging in price from \$12.50 to \$22.

Cold Drawn Manganese Steel is Used in Latest Type Door Hinge

Appearance, strength and durability are improved without increase in cost. Simplified production methods are employed in the manufacture of this body part.

By W. L. Carver

APPPEARANCE, strength and durability have been improved by the application of cold drawn steel sections to the latest type of hinge developed by the Ternstedt Manufacturing Co. of Detroit. These improvements are obtained at no sacrifice in economy for they are made possible by simplification in manufacturing methods. As illustrated by Fig. 1, the new strap hinge has the same general appearance as the usual malleable cast iron or drop-forged steel hinge but closer inspection of the product reveals a uniformity of line and dimension which are not possible with the earlier types.

Increase in strength is sufficient to permit hanging car and bus doors on one less hinge than has been required heretofore in spite of the fact that the new type hinge is somewhat smaller. Close limits of workmanship in the machine shop, particularly at the faces of the hinge joint have eliminated the tendency to throw the weight of the door on the hinge pin and therefore have increased the life of the hinge materially.

Referring to Fig. 2, which is an end view of the finished hinge, it will be seen that the two members are sawed from

cordingly and the tendency to distort under load is reduced materially.

Since the center hole in the male member is reamed larger, the hinge pin rotates with the female member and is fitted with a large rounded head which blends with the exterior appearance of the complete hinge. Due to the limits of accuracy across the faces of the hinge joint, this pin is relieved of all but the purely rotational load and is not subjected to the stresses imposed by the weight of the open door. In consequence the accurate fit of the door is maintained indefinitely.

After exhaustive tests to determine the relative ability of the new hinge Ternstedt executives have decided to discard 28 sizes and types of hinge and standardize this one type which is approximately 1-11/16 in. wide and can be made in any length up to 3 7/8 in. from the center of the pin to the outer end of the female strap. The strap thickness is about 7/32 in.

Details of Production

Production of these hinges is carried on in a line which is an interesting example of modern small parts manufacture. In the first place, all primary operations on these and other punched, turned and milled parts are located next to the raw stock department. This department comprises an entire bay running the length of the building, and is equipped with an overhead travelling crane, the carriage of which is an electric monorail unit that also can be driven along the full length of the outside unloading platform.

Incoming bar and strip stock is unloaded from the cars onto storage racks which are picked up by the electric monorail unit and transferred to the desired place in the raw stock department. These storage racks are arranged so that they can be piled one on top of another in a sectional arrangement, the limit of height being the clearance required by the crane. From this location, these sectional racks loaded with raw stock are delivered as required, directly to positions alongside primary operations by the crane.

All of these machines are located just outside and below the rail for the travelling crane which is farthest from the wall. This arrangement eliminates all handling between the freight car and the first operation regardless of the length of storage period or the size and shape of the material. Since this arrangement of the raw stock department has been put into effect, the cost of material handling has been cut in half as compared to the former conventional method, the saving being 55 cents per ton.

In the case of these hinges, bright cold drawn bar stock in two shapes which conform to the longitudinal cross sections of the male and female portions of the hinge as indicated by Fig. 2, are delivered in bars about 7 ft. long

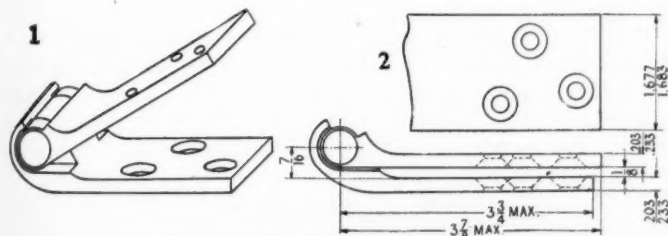


Fig. 1—Assembled view of the new Ternstedt drawn steel strap hinge. Fig. 2—End view of drawn steel hinge showing the sections of the bars for the two members

steel bars of the sections indicated. Subsequently, the male and female heads are machined to form the concealed hinge joint. Then the heads are drilled and the hole in the male head is reamed .004 in. larger. The hinges are partially assembled following this operation and the holes and countersinks for screws used in attachment to the body and door are located from the hinge pin. Due to this procedure the location of the mounting holes is determined with an accuracy of dimension commensurate with the balance of the hinge.

Thickness of the hinge ends varies within .030 in. and the width is held to .006 in. variation, eliminating many of the troubles experienced in laying out sockets or notches in the body shop for the malleable or drop-forged hinge. As the material is cold drawn to finished form, the tensile strength is much greater than that of equivalent drop forged stock and three times as great as that of malleable iron. Resistance to fracture or cracking is improved ac-

to two milling machines, each forming the head end of a production line for that part. In the first operation for each line the blanks are sawed off as illustrated in Fig. 3.

Two opposed fixtures are mounted on the table of a No. 4 plain horizontal Cincinnati milling machine, the arbor of which carries eight 8 in. diameter x 3/16 in. wide, side cutting saws. Set stops reciprocate the table with a fast motion between the cuts. Eight blanks are produced at each pass and the operator reloads the idle fixture while the opposite end is in operation.

Both fixtures are operated from the left side of the machine and a system of equalizing clamps retain the blanks both before and after they are cut off. When the cut at one side is finished and the clamp wheel released, the stop at the inner end of the bar disappears and allows the blanks to be pushed out at the rear.

In operation two in the female line, the slots for the hinge joint are milled out as shown by Fig. 4 on a 48 in. plain automatic mill which is equipped with a rotating indexing fixture.

Eight straps are retained in two tiers in each end of the fixtures, all being clamped through an equalizing bar arrangement and a single lever. Two small levers eject the pieces after the slotting operation is completed. Set stops advance the table rapidly from the loading position up to the working position, then through the straight-in cut and finally return the table to the loading position for the indexing of the fixture.

The concealed joint of the male strap is formed by end mills in the second operation on that part as shown by Fig. 5. In this set-up, the blanks are mounted in a vertical row of three with the strap ends outward. The same equalizing bar and clamping features are also characteristic of this fixture. While one set are being loaded, those on the opposite end are fed into three pairs of end mills which are driven by special three-spindle heads on a 24 in. duplex milling machine.

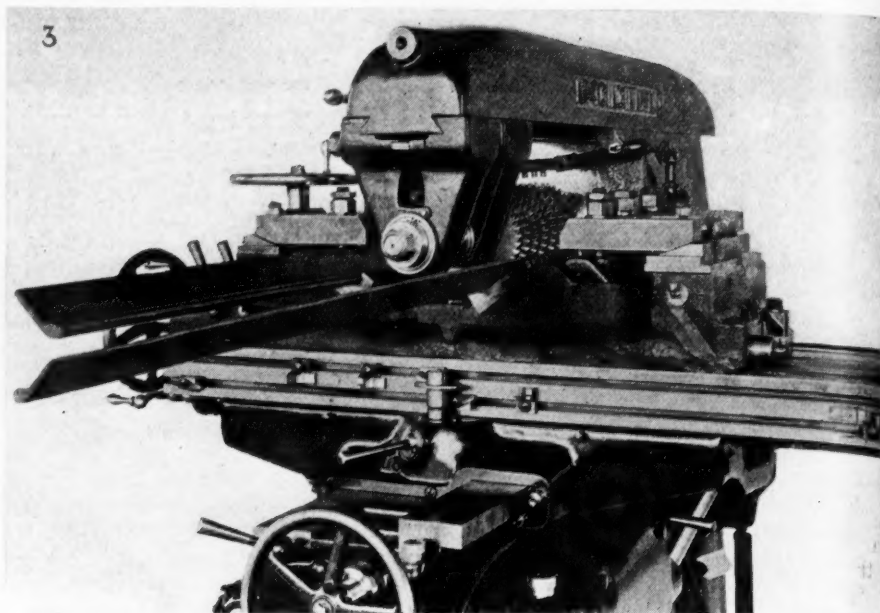


Fig. 3—Multiple sawing operation which produces eight blanks at each operation

Since the system of selective stops is used in this machine also, operation is semi-automatic and the operator is required only to load and index the fixture and operate the control lever. As described, these three machines have a capacity of 5000 hinges per nine-hour day.

Following these operations, the holes for the hinge pins are drilled in both members. This drilling now is performed in double end horizontal machines handling one piece at a time but a six-spindle machine will be put into operation shortly. This operation is followed by the reaming of the hinge pin hole in the male member, this hole being .004 in. larger than the drilled hole in the female strap. Burrs from all parts are removed then by tumbling in tilted barrels.

To insure dimensional accuracy of the completed hinge, the two parts are assembled partially after the tumbling process. The hinge pins are driven in part way by hand and then set down to about 1/2 in. from the finished position in a punch press. In the latter operation, from four

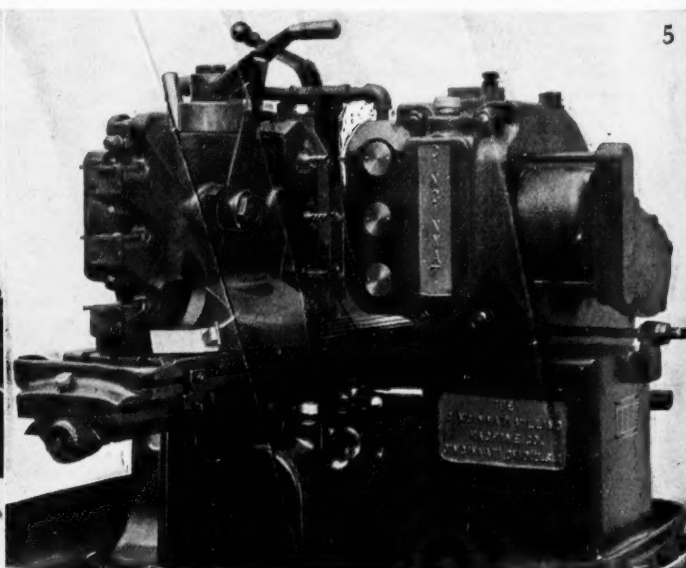
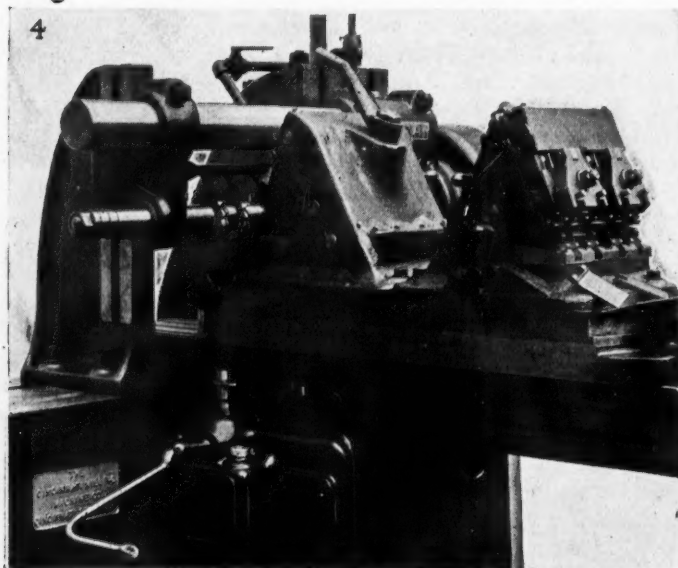


Fig. 4—Hinge joints are milled in eight female straps at each operation. Clamps controlled by a single lever. Fig. 5—Concealed faces of the hinge joint on the male strap are produced three at a pass in this operation

to eight assemblies are processed at one stroke of the press, the ram and bed of which are equipped with flat plates.

This procedure is followed to allow the shanks of the hinge pins to project and act as stops for the subsequent operation of punching the screw holes in the straps. In this way all of the holes are located from the center of rotation of the hinge and therefore facilitate frame production and assembly in the modern production body shop.

17/64 in. diameter holes are punched in the straps in successive operations on one press which is equipped with a double multiple die. In the first die three holes are punched in one strap while the second die performs the same operation on the other strap of the preceding hinge. While the ram is up, the preceding hinge is passed along to the next operation, the hinge in the first is placed in the second die and a new hinge placed in the first.

Countersinking is the final operation in the machine line and is performed in a cam-operated multiple-spindle drill press equipped with an indexing barrel fixture. Six spindles carry drills ground to an 82 deg. angle and the entire head is fed down against a counterweight by a cam. The

barrel fixture is carried in a trunnion bracket mounted on the table of the drill press. The barrel is hexagonal in form with provisions for mounting two hinges on each face and is indexed and locked by air pressure.

At each operation, one hinge is finished and three holes are countersunk in the following hinge which is transferred to the opposite end of the fixture at the next pass over top center. By this process, one hinge is delivered from the machine in each complete cycle of the feed cam and operation is continuous. The hinge pins are not driven down at the plant as this would complicate assembly with the door and the body in the body shop.

Specifications for the steel used in these hinges call for carbon 0.15 to 0.25 per cent, manganese 0.60 to 0.90, phosphorus 0.06 maximum, sulphur 0.07 to 0.15; a tensile strength of 70,000 to 80,000 lb. per sq. in., elongation in 2 in. of 16 to 20 per cent with a reduction of area of 45 to 50 per cent. The stock must bend flat upon itself without fracture. The ordinary malleable hinge is said to have a tensile strength of 20,000 to 25,000 lb. per sq. in. and the ordinary forged hinge 45,000 to 50,000 lb. per sq. in.

Time and Distance Tests Made of Braking

A CONSIDERABLE amount of experimental work relating to different phases of stopping motor vehicles by their brakes has been done recently by the Bureau of Standards.

A four-wheel brake car, equipped with thermocouples in all brakes, was run at several temperatures of brake linings to determine the effect of temperature on deceleration. These tests have been made on several types of brake linings and the effect of increase of temperature of the linings, in each case, has been to decrease the coefficient of friction. Curves have been plotted showing this effect.

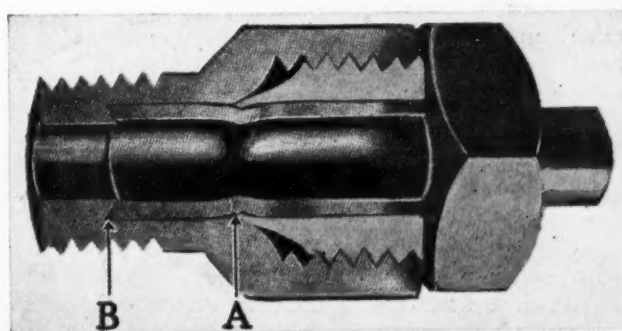
On July 30 and 31 tests were made in Washington on about 180 cars to determine the general braking ability of the average car on the road. The average stopping distance from 20 m.p.h. for service brakes was found to be about 45 ft. and for hand brakes about 78 ft.

Arrangements were entered into with the Deputy Commissioner of Motor Vehicles for the State of Maryland, to test cars, the drivers of which were applying for driving licenses. On Aug. 12 and 13 these tests were made in Baltimore. About fifty cars were tested. The general average for service brakes was found to be about 44 ft. and for hand brakes about 65 ft.

In connection with the study which the bureau has made of brakes and braking systems, measurements have been made of the time elapsing between the instant when a car driver is told to stop and the instant when the car actually begins to slow down due to the action of the brakes. This time interval was measured with nine different drivers and its average value was found to be about one-half second. A part of this time interval is due to what may be termed the reaction time of the car operator, that is, the time elapsing between the instant when the command to stop is given and the instant when the operator makes the first of the series of motions necessary to the braking of the car. The remainder of the time interval is consumed in the making of these motions, that is to say, in moving the foot from the accelerator to the brake pedal, in moving the pedal sufficiently to take up the lost motion in the braking system, etc.

The importance of keeping this time interval as small

as possible will be evident when it is realized that a car traveling at 30 m.p.h. will go 22 ft. in that time. Many four-wheel brake cars can be brought to a stop from that speed in a distance of 45 ft. This factor becomes more important as the effectiveness of brakes is increased since the distance traveled by the car between the time when the car begins to slow down under the action of the brakes forms a greater proportion of the total distance traveled before the car is actually brought to a stop.



Dole double compression coupling

A FITTING termed the Dole Double Compression Coupling and designed for use in connecting copper tubes together or to such parts as carbureters and fuel tanks is being marketed by the Dole Valve Co. of 1933 Carroll Avenue, Chicago.

This coupling is claimed to insure against leakage caused by loosening through vibration. It requires no brazing or soldering and no flaring of tubes or loose sleeves. As seen in the accompanying cut, a double joint is secured at A where the screw union compresses the tube and at B where the tube is swedged into a V-slot.

The fittings are made in a number of patterns and standard sizes. It is claimed that they can be connected or disconnected as often as desired without danger of leakage.

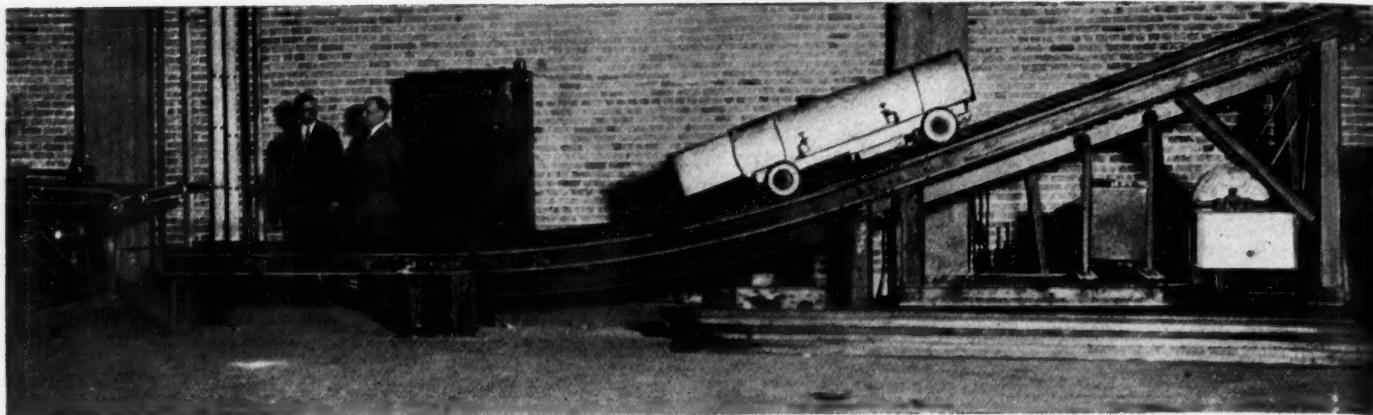


Fig. 4—Bumper test plant at Underwriters' Laboratories, Chicago

Low Weight and Great Shock Absorption Chief Aims of Bumper Design

*Conditions under which tests are made by Underwriters' Laboratories.
Static tests and methods of calculating results. Height from
ground and standards given for mounting.*

Part II

By P. M. Heldt

IN some designs of bumper having a bumper bar of comparatively little flexibility, flexible members are introduced in connection with the mounting brackets. These flexible members or cushions may be in the form of coiled springs or rubber blocks. As the amount of energy which can be stored by such devices is directly proportional to their mass, it would seem that their energy storage capacity as compared with that of the ordinary spring steel bumper much be decidedly limited. Of course, this storage capacity is additional to that possessed by the bumper bar.

Bumper Tests

Since bumpers are always subjected to dynamic loads in action it would seem logical to employ the same kind of load in testing them, and the Underwriters Laboratories use this method in making their tests. They have a special impact test machine which they use to obtain data which indicates the degree of protection from collision damage the bumper under test will offer. The deflection of the bumper under the impact is recorded automatically and the permanent set can be measured after the test, in addition to which any permanent deformation of the car frame may be noted. The test installation is shown in Fig. 4.

The special test apparatus consists of a 2000 lb. weight or ram provided with a curved end mounted upon ball bearing wheels and rolling upon an inclined track. At the end of this inclined track is a rigid stand carrying a standard automobile frame upon which the bumper under test is mounted in the regular manner. The entire assembly is such that the center of the bumper will receive the direct impact of the moving weight.

Bumpers are divided into three classes with reference to the weights of the automobiles upon which they are

to be used, namely: Bumpers for automobiles weighing 2500 lb. or less, 3500 lb. or less, and all weights; and the severity of the tests is increased with the weight classification.

Two samples of each size and design of bumper are tested, one being given a successive impact test and the other a single impact test. In the successive impact test four to six impacts are given of gradually increasing magnitude. This successive impact test is intended to indicate to the manufacturer at just what point failure occurred in case the results are below standard. The single impact test is a single blow and is a severe test on both bar and fittings.

A list of standard requirements has been drawn up which covers about fifteen points. The most important of these are that the bumper bar or any of the attachment fittings shall not break and that the total deflection shall not be more than 15 in. Other items considered in the standard are: Ease of installation and maintenance, durability with respect to corrosion and vibration, physical effects on the frame of the automobile in case of collision, and uniformity of the product.

Inspected at Factories

An inspection program is put into operation at the bumper factory after the tests are completed and bumpers are listed, under which not only the size and construction of the bumper bars and fittings are accurately checked at frequent intervals, but tab is kept on the uniformity of the heat treatment by means of bending tests.

In the following is given a resume of the rules under which bumpers are tested in the Underwriters Laboratories. The complete set of impacts and the kinetic energy of the 2000 lb. weight at each impact are given in the following table:

Impact No.	Velocity of 2000-Lb. Weight, m.p.h.	Kinetic Energy 2000-Lb. Weight Ft.-Lbs.
1	1.337	119.6
2	2.14	306.8
3	2.95	582.4
4	3.76	947
5	4.58	1,404
6	4.86	1,575
7	5.41	1,955
8	5.68	2,160
9	6.23	2,600

Automobile bumpers are divided into three classes: First, those designed for cars weighing 2500 lb. or less; second, those designed for cars weighing 3500 lb. or less, and third, those designed for cars of all weights. Two bumpers of each model are used for a complete impact test. One bumper is given a successive impact and the other is given a single impact.

Front bumpers of the first class are given the following successive impacts: 1, 2, 3, 4, and the single impact 6. Bumpers of the second class are given the following successive impacts: 1, 2, 3, 4, 5, and the single impact 8. Bumpers of the third class are given the following successive impacts: 1, 2, 3, 4, 5, 7, and the single impact 9.

Rear bumpers of the 2500 lb. or less and 3500 lb. or less classes are given the following successive impacts: 1, 2, 3, 4, and the single impact 6. Rear bumpers of the all weight class are given the following successive impacts: 1, 2, 3, 4, 5, and the single impact 8.

Such items as apply in the front bumper Standard Requirements are used in connection with rear bumpers. The maximum allowable deflection in the case of a universal rear bumper is 12 in. In the case of special rear bumpers the maximum allowable deflection is the available clearance.

At any time during either of the impact tests the bar of the bumper and its parts shall be intact and shall not sustain an instantaneous maximum deflection or more than 15 in. in its center nor become detached from the fittings.

If the automobile for which the bumper is designed is

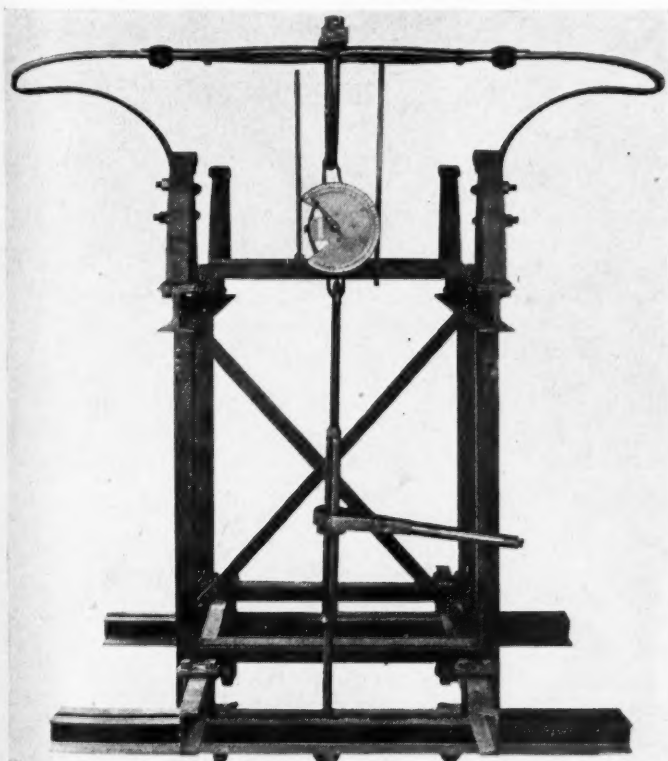


Fig. 5—Bumper testing stand which applies static loads

equipped with a front cross frame brace located within 15 in. of the bumping bar, this brace shall not be broken on completion of either of the impact tests or distorted so as to draw the ends of the frame horns together more than 1/2 in.

As a result of the impact tests the front face of the bumper shall not be elevated or lowered more than 3 in.

Requirements Pertaining to Fittings

The fittings shall not become detached from the test frame due to fracture or other causes at any time during the tests.

If the fittings are clamped to the flanges of the side frame members, one or both shall not have slipped to the rear more than 2 in. on completion of the tests.

The attachments, such as bolts, U-bolts or hook bolts, shall be of sufficiently soft material to distort during the tests rather than fracture.

The ends of the frame horns shall not be drawn together or spread apart more than 1/2 in. at any time during the tests. If the car for which the bumper is designed is not equipped with frame horns, no part of the car to which the bumper is attached shall be injured so that it is in a weakened condition or requires replacement.

Table I—Results of Static Loading Test on Loop Type Bumper

Load in Lb.	Deflection in Inches	Work Done in In.-Lb.
200	9/16	56
400	1 3/8	244
600	2 1/8	375
800	2 13/16	481
1,000	3 1/2	619
1,200	4 3/16	756
1,400	4 13/16	812
1,600	5 7/16	937
1,800	6 3/16	1,275
2,000	6 7/8	1,306
2,200	7 11/16	1,706
2,400	8 11/16	2,300
2,600	8 9/16	312
2,700	8 13/16	662
2,800	8 7/8	172
3,000	9 3/16	906
3,200	9 1/2	969
3,400	9 13/16	1,031
3,600	10 1/8	1,094
3,800	10 7/16	1,156
4,000	10 13/16	1,462
4,200	11 3/16	1,537
4,400	11 5/8	1,881
4,550*	11 15/16	1,400

Total, 22,819

Bumper broke under this load.

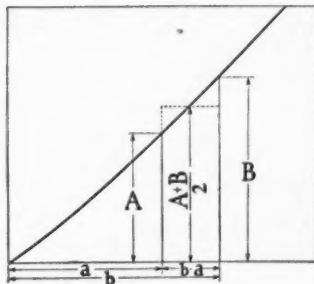
Table II—Results of Static Loading Test of Arch Type Bumper

Load in Lb.	Deflection in Inches	Work Done in In.-Lb.
200	9/16	56
400	1 1/4	206
600	1 7/8	312
800	2 11/16	568
1,000	3 7/16	675
1,200	4 5/16	962
1,400	5 3/8	1,381
1,600	6 5/8	1,875
1,800	8	2,337
2,000	9 3/16	2,256
2,200	10 7/8	3,544
2,400	12 1/8	2,875
2,600	13	2,187
2,700*	13 5/16	414

Total, 19,648

*Bumper slipped in fastenings.

Less expensive and less bulky apparatus will serve for making a test of bumper deflection under static loads, and this method is the one generally used by bumper manu-

Fig. 6—Diagram
for determining
energy absorbed

facturers. Fig. 5 shows such a testing stand. It consists of a framework of rolled steel shapes to which are clamped a pair of bronze castings simulating the forward ends of the frame side bars and the front springs of the car. These bronze members point upward and the bumper is secured to them as it would be to a car frame. Gradually increasing static loads are then applied by means of a turnbuckle through a spring scale, the turnbuckle being anchored to the base of the machine. The deflection for any load can be measured by means of a foot rule. If desired, the load can be removed after having reached a certain value and the permanent set of the bumper and also the deformation of the parts representing the forward end of the chassis measured. Of course, the deformation of a car frame fitted with the bumper under similar conditions of load would depend upon the rigidity of the frame, but it is logical to assume that if one bumper causes a greater deformation of the test frame under a given load than another, it would also cause greater deformation of the car frame under equal conditions.

From the observations taken in such a test a load-deflection curve can be drawn which constitutes what might be called a characteristic curve of the bumper. It is also possible to calculate from the data obtained in the test the amount of energy absorbed by the bumper up to any given deflection. Referring to Fig. 6, let a be the deflection of the bumper under a centrally applied load A , and b the deflection under a load B . Then the point of application of the load is evidently moved through a distance of $b - a$ against a resistance which gradually increases from A to B and has a mean value of $(A + B)/2$. Hence the amount of energy absorbed in increasing the load from A to B or in increasing the deflection from a to b is

$$E = (b - a) (A + B)/2.$$

By means of this equation the energy absorbed during each step in the application of the load on the bumper may be calculated. Table 1 herewith shows the observa-

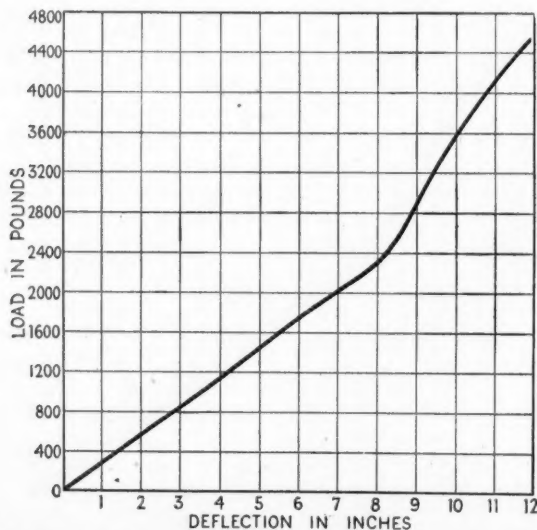


Fig. 7—Deflection diagram of loop type bumper

tion data of a test made on a 39 lb. bumper of the loop type which was tested to destruction. The figures in the third column were calculated from those in the first two by means of the above equation. By adding up the quantities of energy absorbed during the different steps in the loading of the bumper, the total amount of energy absorbed can be determined.

There is one slight discrepancy in the observation data in that a smaller deflection is produced by a load of 2600 lb. than by a load of 2400 lb. This is at least partly accounted for by the fact that after the load had been increased gradually to 2400 lb. it was completely removed in order to measure the permanent set of the bumper and the deformation of the frame.

In Fig. 7 is shown the deflection diagram of a bumper of the loop type with a reinforced center section. This bumper weighs 39 lb. and deflected 11 15/16 in. under a load of 4550 lb., when it broke. The total energy absorbed by the bumper up to the point of failure was 22,819 in.-lb. It was stated in the foregoing that steel of the kind of which this bumper was made would absorb elastically

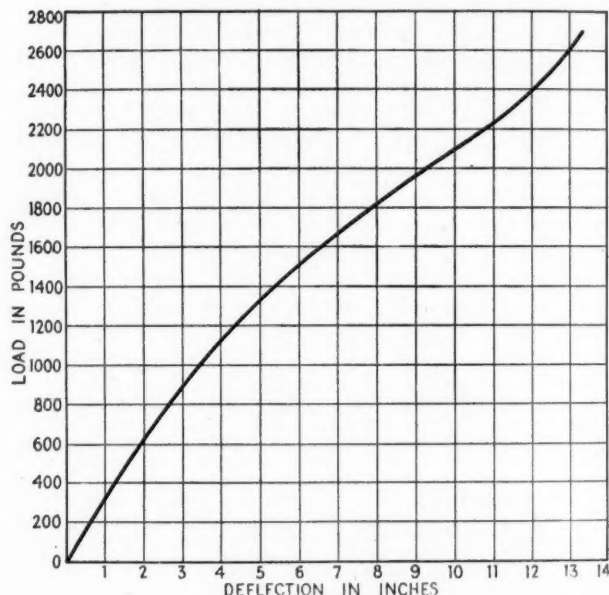


Fig. 8—Deflection diagram of arch type bumper

about 100 in.-lb. per pound, hence, disregarding the small weight represented by the fastening means, which is negligible in this case, this bumper can absorb only about 3900 in.-lb. of energy elastically. The rest of the energy actually absorbed is partly accounted for by plastic deformation (permanent set) of the bumper and partly by both elastic and plastic deformation of the frame.

Test data similar to the above for another type of bumper are given in Table 2, while the corresponding deflection diagram is shown in Fig. 7. The results of the tests can also be plotted in another way, as energy absorbed vs. load, and the curve corresponding to Fig. 7 is shown in Fig. 8.

Plastic deformation of the frame is one of the things the bumper is designed to prevent, and for any given force of impact this item should be as small as possible. It was stated in the foregoing that the force of impact is transmitted almost integrally to the points of attachment to the frame. Under certain conditions the force on the frame side members may even be much greater than the load on the bumper. Consider, for instance, a bumper consisting of a comparatively light, straight bar which fastens to the spring horns through short, rigid brackets. In that case, if an impact is sustained at the center of

the bumper, a sort of inverse toggle action takes place. If the load on the bumper is in a direction parallel to the axis of the car the pressure exerted on the frame in that same direction will be substantially equal to the load on the bumper, but in addition there will be a force tending to draw the spring horns together which may be several times that of the load on the bumper. (See Fig. 10.) The effect on the frame may, of course, be greatly lessened by employing brackets of considerably less rigidity in the horizontal direction than the frame members. If the bar is arched instead of being straight, the bending force on the frame may become serious only about the time the bar abuts against the front frame cross member.

Limitation of the transverse forces on the spring horns and the frame is one of the chief objects of certain loop and arch designs of bumper. In these types the spring horns are not tied together by that portion of the bumper which sustains the greater deformation in case of a collision and, while the reaction at the point of attachment to the frame is still at an angle to the frame bars, the component transverse to these bars is undoubtedly smaller

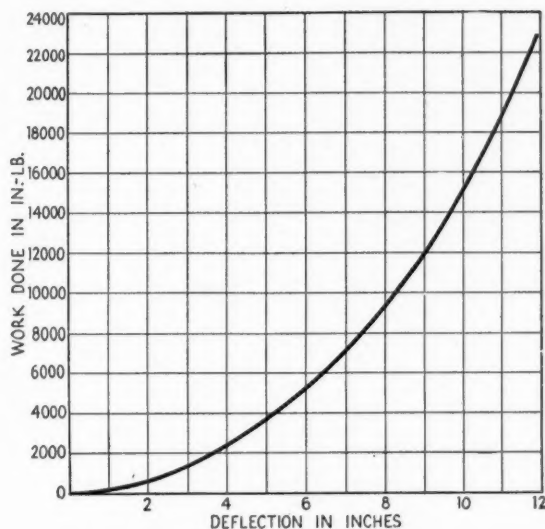


Fig. 9—Load absorbed energy curves

than where a single bar is fastened so as to connect the spring horns directly.

In some cases the bumper is in the form of a complete loop, comprising a front bar which receives the shock and a rear bar which forms a distance piece between the spring horns. In that case the rear bar serves to stiffen and maintain the shape of the frame until the front bar comes into contact with the rear bar and the latter begins to partake in the deflection.

The deflection curve shown in Fig. 6 consists substantially of two straight lines. The first straight line represents the conditions while the whole of the bumper is active and the second those when the loops are closed up and the beam is therefore greatly shortened and consequently is much stiffer. Some bumpers have a deflection curve made up of three substantially straight lines. In that case the first straight line evidently represents elastic deflection of the whole of the bumper material, the second line plastic deformation of the bar and, therefore, more rapid increase in deflection for a given increase in load, while the third straight line represents conditions after a certain portion of the bumper has been rendered inactive by an abutment.

Since a good many bumpers use the arched form of construction, it is not amiss to say a few words with respect to the effect of this shape as compared with one having only flat or straight members. If we regard the

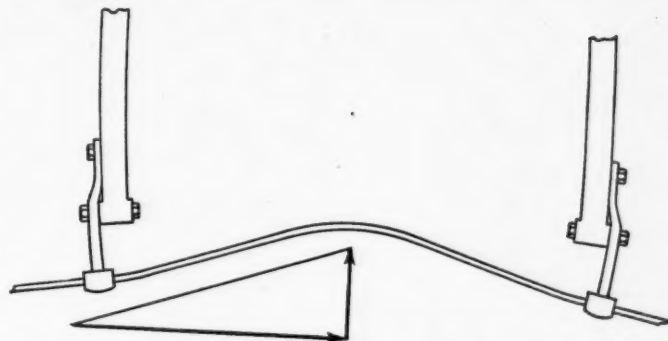


Fig. 10—Diagram indicating transverse force on spring horns tending to bend frame members

ends as comparatively rigidly supported, an arched member of the same section and the same distance between supports will deflect less than a straight member for equal small loads. But once the arched form has broken down it will deflect more rapidly. The form of energy storage is essentially the same in the two cases and there is no reason to assume that the total amount of energy which can be stored is materially different. Owing to the fact that in the arched bar the resistance builds up more rapidly, since the energy absorbed is proportional to the area included between the curve and the horizontal axis, for a certain amount of energy absorbed the maximum pressure on the frame should be less, which is a desirable feature. On the other hand, with the arched type a more rapid increase in frame distortion might be expected. The two types are, however, capable of such variation in shape that it is difficult to make a comparison in general terms.

Methods of Mounting

There are two general methods of securing the bumper or bumper brackets to the frame. One consists in the use of hook bolts which hook over the flanges of the frame channel and pass through holes in the bumper bar on the bumper bracket, and the other in the use of bolts which pass through holes in the web of the frame channel and the bar or bracket. The advantage of the former method is that it facilitates mounting, as it is not necessary to drill holes in the frame bars. The champions of the bolt-fastening method argue that the web of the frame bar constitutes a better anchorage, as it is supported by the flanges on both sides, whereas the flanges are supported on one side only. Very frequently the front spring bolt is made use of to obtain a secure anchorage for the bumper.

A certain amount of standardization work has been done by the S. A. E. in connection with bumpers. It is obviously desirable to have the bumpers on all cars mounted at the same height above the ground, so that in the case of a collision between two cars both fitted with bumpers the two bumpers will come together. The distance from the center of the bumper to the ground has been standardized at 20 in. for front bumpers and 21 in. for rear bumpers. For the mounting of front bumpers the size and locations of two holes in the frame channel

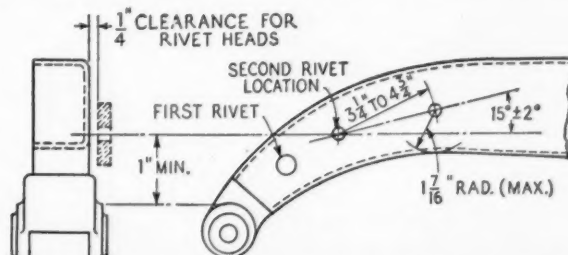


Fig. 11—S. A. E. standard mounting for bumpers

are specified. As shown by the drawing, Fig. 11, two $33/64$ in. bolt holes are to be located on or near the neutral axis of the frame section. The first bolt hole back from the rivet eye may coincide with the first or second rivet hole. In cases where the second bolt hole is to be used for a shock absorbing device, this hole is to be located not more than $17/16$ in. from the bottom of the frame channel at the nearest point. Manufacturers of bumpers using the bolt mounting strongly urge car manufacturers to provide their frame bars with these two bolt holes.

One feature of bumper design that must not be overlooked is that of appearance. The bumper is the most conspicuous part on any car, and no motorist would be

inclined to fit such a device if it detracted from the appearance of his car as a whole. Now, in this connection the old engineering adage that "Whatever is right looks right" would seem to apply, the qualification "to the trained eye" being implied. A bumper that has its metal so disposed as to be substantially uniformly effective, taking into account the possibility of sustaining impacts at all points of its length; which is secured to the frame in a secure manner, yet so that no excessive transverse strains can be imposed upon it for impacts within the capacity of the bumper to absorb, and which is given a neat and durable finish, cannot fail to meet reasonable requirements with respect to appearance.

Light Weight Features New Type of Conveyor Chain

A COMPACT variable reduction gear for driving conveyor lines and a unique type of drop-forged link chain are the most recent developments of The James F. Miller and Hurst Corp. of Detroit. With the new reduction gear, conveyor speeds can be varied continuously within limits of 1 to 5. The new type of conveyor chain is considerably lighter and stronger than the malleable chain usually used for the purpose. Although originally developed for use in anthracite coal breakers, it is also well adapted for foundry service.

As illustrated in Fig. 1, the reduction gear is built into a cast iron frame. An electric motor connects through an inclosed silent chain to the Lewellen variable speed transmission which comprises two pairs of metal cones, of which each pair forms a pulley of variable diameter. A built-up leather and wood block belt connects these pulleys. By a suitable mechanism one pulley can be enlarged and the connected one simultaneously reduced in diameter. Ordinarily an installation is worked out with the belt operating at the mean diameter of the pulleys. Speed control is by an external handwheel.

In the manufacture of the driving belts, wood blocks are bolted to a leather belt with intermediary leather rocking pads. Steel plates form the bearing surface for the bolt heads on the back of the leather belt. When assembled, the ends of the wood blocks are ground to the proper length and angle, and leather contact pads are attached (see Fig. 2). Anti friction bearings are used in both the variable gear and the spur reduction gear.

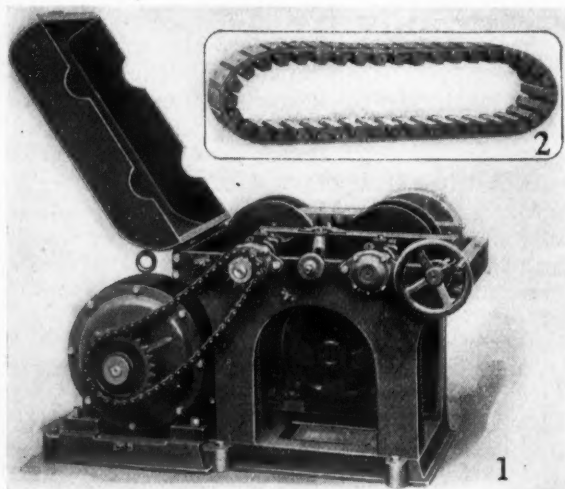


Fig. 1—Variable speed reduction gear, incorporating Lewellen transmission, for conveyor line operation

Fig. 2—Built-up leather and wood block belt used in Lewellen transmission

From the driven end of the spur reduction gear a sprocket and roller chain drive connects to the head shaft of the conveyor line. These units are made in many different sizes. The smallest, with a 1-hp. motor, delivers 17,000 lb.-in. maximum torque at the headshaft, with a speed range of 0.154-0.77 r.p.m., while the largest, with a 5-hp. motor, delivers a maximum of 84,000 lb.-ft. with a

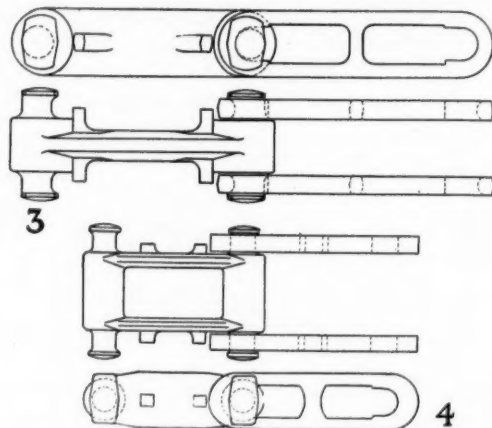


Fig. 3—Closed link type of drop forged chain, all units being forged

Fig. 4—Open link type drop forged chain

speed range of 0.489-2.44 r.p.m. Motors are furnished to suit the line current available.

Weight reduction and increase in strength are the outstanding features of two new types of drop-forged chain, and these features are particularly important in new installations. The chains fit standard sprockets.

Fig. 3 illustrates typical center and side links of the closed link type of drop-forged chain. When the chain is assembled the side links are swung at an angle of 90 deg., in which position their eyes pass over lugs on the pin projections of the center link. When swung around to the normal operating angles, lugs on the center link prevent the disengagement of the side links. These lugs on the center links are also utilized for the anchorage of special fixtures or adapter brackets which are clamped on by means of two bolts. In addition to operation on standard sprockets, these chains accommodate practically all of the standard adapter fittings of existing practice. Fig. 4 illustrates the center and side links of the open type of drop-forged chain.

S. A. E. 1035 steel is used for the forgings, which are heat-treated. An inspection of the design reveals that no machine-operations are needed to finish the links, all of the required dimensions being produced by trimming the forging closely.



The FORUM



What our readers say about different alloys and their effect on piston scuffing, carbon monoxide and English use of small tires.

Piston Scuffing May Depend on Character of Alloy

Editor, AUTOMOTIVE INDUSTRIES:

Some very interesting comments have been presented in your publication as a result of Frank Jardine's paper on scuffed pistons.

The first reaction on reading Mr. Jardine's article is that the lubrication of an engine cylinder in cold weather involves a problem of serious consideration with respect to the present day oiling systems.

After having given more careful thought to the valuable data offered, however, something might be said regarding (1) the pressure which this type of piston exerts on the cylinder wall contributing, possibly, to the condition named, and (2) the piston alloy used with respect to its relative value as a bearing metal.

As to the first, the pressure of the piston against the wall, our experience inclines us to believe that a definite piston clearance aids in the holding of the oil film between the piston and the cylinder wall by capillarity. The type of piston used, due to its design, may have induced metal to metal contact and consequent breaking down of the residual oil film, more so than some other designs.

It would be interesting to have some data on the measurements of the piston bearing surfaces to disclose any worthwhile information on distortion, as we feel that distortion, with its resultant local high pressure areas, is invariably the cause of wear or scratching of pistons.

Further, it would have been of great value to have secured, for comparison, data on further tests, using full skirted pistons of aluminum and other metals to determine if this effect of little or no lubrication were characteristic of either the type of piston used or the piston material.

In the use of magnesium alloy pistons we have never associated a scratched piston condition with a cold engine.

With reference to non-ferrous piston alloys and their relative values as a bearing metal, we believe a direct relation exists between their bearing values and their respective coefficients of friction in a dry or nearly dry cylinder condition.

Some interesting experiments recently were conducted which, to a limited degree, bear out this thought. The conditions of test were in no way comparable to the severe pressure conditions existent in an engine—we are merely citing a case where a piston metal of low coefficient of friction showed no signs of wear—operating in a dry cylinder.

A two cylinder pump was built, to handle a saturated gas of negligible lubricating value, without cylinder water jackets or air cooling fins, and to operate without lubricating oil. Dowmetal pistons were used, carrying rings

of very light wall pressure, operating in cast iron cylinders.

As an air pump it was run for several weeks absolutely dry of any lubrication, and during this time it carried a vacuum within $\frac{3}{4}$ in. of the barometer reading. The cylinder remained cool (not over 120 deg. Fahr.), and after approximately 600 hours' operation neither the pistons nor cylinders showed signs of wear. Power absorption of the pump was measured with very sensitive instruments and it was determined that the friction loss of pistons and rings was not over 30 per cent of the total power loss of the pump.

Lubricants the consistency of kerosene affected neither the power readings nor the vacuum maintained.

CHARLES C. THOMAS,

Engineer, Dow Metal Division, The Dow Chemical Co.

Dry Gas Helps to Avoid Carbon Monoxide

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial on "Poison Gas" in the Sept. 18 issue so emphasizes the evil effects of carbon monoxide in the exhaust that the problem should have immediate consideration.

That dire results are probable is prophesied by the Medical Board in New York City, which goes so far as to suggest delivering the exhaust to the air from the top of vehicles in order to prevent the contamination of the atmosphere in the breathing zone in the streets.

The legitimate products of combustion, water and carbon dioxide are not injurious to man except when the latter is in such large quantities that the oxygen is shut off, but carbon monoxide is deadly in quantities discharged by the exhaust of the average internal combustion engine using available fuel, as evidenced by the number of fatalities in tight garages.

While monoxide may be generated by insufficient air for the fuel content, it is seldom found in engines using fixed dry illuminating or natural gases, showing that there must be another cause for the increasing monoxide in the exhaust of our gasoline burning engines.

It is a well known fact that liquid fuel will not burn until it is changed to gas, and it is also a fact that the heavy ends of our present fuel will not gasify until heated so hot that the power of the engine will be cut in half.

Liquid fuel spheres, no matter how small, in the induced charge will not support perfect combustion, as the atoms of oxygen do not penetrate the liquid; therefore, imperfect combustion—CO instead of CO₂—is the inevitable product.

If fuel reaches the lubricating oil, and probably 95

per cent of automobile manufacturers recommend changing the crankcase oil every 500 miles to offset the effects of contamination, the exhaust products are bound to contain a monoxide content.

A leaner mixture will not entirely prevent the liquid fuel from reaching the crankcase oil, nor will it be possible to eliminate the monoxide in the exhaust as long as liquid fuel reaches the combustion chamber.

The solution of the problem is to convert the fuel into a dry gas before it reaches the cylinder. There are numerous methods of recovering the fuel after it has worked by the pistons so that the lubricating oil will retain its viscosity, but all such devices neutralize only the effect of liquid fuel on the crankcase oil and do not prevent the formation of the poison gas or the losses of efficiency caused by imperfect combustion.

That monoxide gas in the exhaust is a dead loss is apparent when we consider that monoxide generated intentionally in gas producers is the gas which generates the power.

If a dry gas mixed with the proper amount of air will not produce carbon monoxide, the solution of the poison gas problem can be solved only by changing liquid fuel into a dry gas before it reaches the combustion chamber, and to maintain the full power of the engine the air must not be heated above the dewpoint.

"Hot spots" materially assist in the gasification of present day fuel, but as the engine capacity varies inversely as the dryness of the gas, such devices have their limitations.

The device illustrated in a recent number of *AUTOMOTIVE INDUSTRIES* and the August *S. A. E. Journal*, page 173, converts the liquid fuel into a dry gas without heat-

ing the air above the dewpoint, not only eliminating the formation of poison gas but the mixing of fuel with the lubricating oil, and by converting the fuel wasted in the exhaust and lost in the crankcase into work, increases the car miles per unit of fuel from 15 to 60 per cent. This device eliminates the cause of poison gas, crankcase oil contamination and the inefficiency indigenous to our available fuel.

CHARLES E. SARGENT,
Chief Engineer, Elgin Street Sweeper Co.

Use of Small Sized Tires in England

Editor, *AUTOMOTIVE INDUSTRIES*:

In the July issue of *AUTOMOTIVE INDUSTRIES* there was an article on the English business conditions in general of automotive products and, believing that our distributors in London Industrial Rubber Products, Ltd., would be interested, we sent the clipping to them. Upon acknowledging receipt of this article, our distributors claim that "so far as tires are concerned, the information given is grossly misleading and inaccurate. There are about half a dozen makes of English cars using 30 by 3½ size, including the Standard, Bean, Alvis; also several others using inch sizes. Rolls Royce use 33 by 5 and 32 by 4½, one model of the Wolseley has 32 by 4½, fitted, and one model of the Standard 31 by 4. This is only a rough statement, but it is sufficient to show how very inaccurate the article is. This, by the way, we usually find to be the case with American articles written on English subjects with which we are conversant." We thought the comments of our English distributors would be of interest to you.

C. E. WAGNER,
Export Manager.

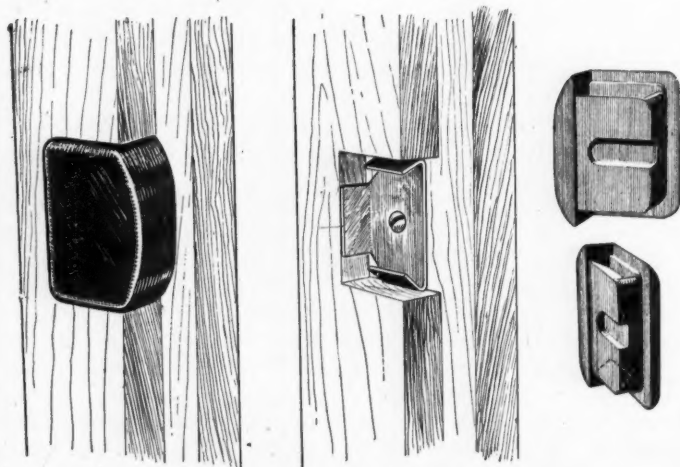
Single Screw Attaches New Door Bumper

A NUMBER of novel features are incorporated in a new door bumper called the Atwood Crown Bumper, recently placed on the market by the Atwood Vacuum Machine Co. of Rockford, Ill. As shown in the accompanying cut, the bumper consists of two pieces, a stamped metal retainer and a molded rubber block which covers the retainer and is held in place by it.

Among the advantages of this retainer may be mentioned the following: It is easy to install, since the re-

tainer requires only a single screw and will fit into a recess with either square or round corners, and which does not have to be held to an exact size, that is, close fitting is not essential. The rubber is flanged so as to hide all rough edges of the wood. It also covers the retainer completely. Construction is said to be such that full compression of the rubber is possible. It can be installed after painting, and thus prevents an unsightly appearance at the joint between rubber and wood.

The rubber block is recessed to receive the turned-in clips of the retainer, and is easily pressed into place in the latter. When in place it is locked securely so as not to pull out accidentally. A feature worthy of note is the clean external appearance given by the rounded surface and corners of the bumper.



Atwood Crown door bumper. Note metal retainer and neat appearance of rubber block

JAMES H. BLISS, Comptroller of Libby, McNeill and Libby and Assistant Professor Accounting at Northwestern University, has just had published a book entitled "Management Through Accounts." It is designed for executives, accountants, teachers and students of accounting and is a companion volume to his earlier book, "Financial and Operating Ratios in Management." It is written from the viewpoint of the manager rather than the accountant, and, as the title suggests, tells how to prepare and use accounts and reports for effective and flexible control of a business. It was published by the Ronald Press, New York. Price \$6.

~ Editorial ~

Foreign Trade and Politics

ONE of the South American republics has passed a ruling that hereafter no cars with left-hand drive will be licensed to be operated on the roads of that country. No reason for this rather remarkable action is given in the reports which have reached here, but the presumption is that some one close to the Government found cars with left-hand drive rather troublesome competitors.

That left-hand drive has a balance of advantages in a country in which the rule of the road is to keep to the right, is now generally admitted. The best circumstantial evidence of its merit is the fact that although first introduced on a car at the lower end of the price scale, it has been adopted for cars in all price classes. Usually, in order that a feature may become popular, it must be sponsored by some firm building cars "of class." This has been the history of most improvements in automobile construction, and for a feature to come in at the other end of the business and succeed generally, it must have real merit.

It may have seemed a fine idea to the parties behind the ruling to get rid of competition in this way, but the scheme will not succeed, as the importers of American cars undoubtedly are sufficiently energetic to change their cars to comply with the law. The sufferers will be the purchasers of cars, who probably will have to bear the expense of making the necessary changes and then will get cars not as well adapted to their needs as the original ones.

Farm Buying

REPORTS that the farmer is in much better financial condition than at any time in the last two years seem to be well founded in general, but it appears that a little too much optimism has been expressed in some circles about the immediate effect of this favorable condition on automobile sales. The big wheat crop has brought money to the farmers in Kansas and in similar wheat-growing sections, but a good bit of it already has gone toward liquidation of old debts at the banks. Then it has been necessary to buy wagons and farm implements to meet immediate requirements, while deferred clothing purchases also have been made.

Having completed these expenditures a good many farmers have been inclined to leave their remaining money in the bank for the time being just to see how it feels to have a surplus for a change. Resumption of spending can be expected in November, however, according to our correspondent in Kansas, who says that the excellent corn crop in Missouri is certain to affect sales favorably in that State as well. He adds that "the fast improvement in roads in both States will hasten the development of good business."

These bulletins from one important agricultural section simply bear out the general impression that business is coming back, slowly but steadily. Improvement in the farm market seems certain to continue, but it is important that the true facts be recognized fully so that overproduction may not result from undue optimism.

Mounting Accessories

IT is not practicable for manufacturers to fit their cars with all of the accessories that a great many users want, such as bumpers, shock absorbers and the like, because this would add to the price at which the car would be sold and thus restrict the possible market, especially in the case of the lower priced cars. But one thing the manufacturer can do without any appreciable expense to himself, that will prove of material value to the owner if he wants to apply these fittings himself later on, and that is to provide suitable means for mounting them.

It is a commonplace that an accessory which is originally built into the car is generally more attractive in appearance and often more serviceable than one fitted as an afterthought. Moreover, the cost of fitting accessories is often considerably greater where a special study has to be made of the method of mounting. By providing suitable means for mounting the more common accessories the car manufacturer can render a service to those of his customers who want their car complete, and at the same time relieve the manufacturers of the accessories referred to of a great deal of trouble.

The step recently taken by one of the large manufacturers of popular priced cars in providing a bracket or plate for the attachment of bumpers is to be commended as an example for others.

Open-Minded

SOMEWHERE in that wide range of people between "the easy mark" and the skeptic is the man still young enough to have an inquiring mind, yet sufficiently keen and experienced to bring considerable common sense to bear on any problem. He has character enough to say No without becoming platitudinous. He does not pass the buck. When someone approaches with a new device apparently sound in theory and which promises some real advantage to his particular product he recognizes it.

He sees that that device or article is incorporated into his product in such a way as to insure a fair test of its practical value. He is willing to be convinced. He is neither skeptical nor overenthusiastic. An earnest desire to improve his product allows for no prejudice either for or against. And he sees that the men in his employ are also possessed of unprejudiced, inquiring minds.

Our Industry Today—

The Purchasing of Automobiles in Many Instances Is Being Deferred Until Elections Are Held Next Month

NEW YORK, Oct. 13—Despite the usual drawbacks of the pre-election period, sales of automobiles are progressing at a satisfactory rate, with some hesitancy shown and buying in many instances being deferred until next month.

There is no decline in volume, taking the country as a whole, and it is felt that in those sections where there has come a slowing up the slack will be overcome in November. This will not make next month, however, abnormal in sales volume, neither, from present indications, will it bring October below normal for the month.

The first week of October shows that September operating schedules are being followed closely. None of the output, factory reports indicate, is going into warehouses or being used to replenish dealer or distributor stocks. Manufacturers are not building against any possible demand, but only for actual consumer requirements. When more active operations will begin toward getting ready for spring demand is problematical, but it is not likely that any great forward steps will be taken this year by the car builders.

Farmer Not Prominent Now

The stepping-up is more likely to occur the first of next year, when the outlook will be better defined and both city and farm buyers will indicate clearly their absorbing power. What buying comes from farm districts this year is expected to be merely a forerunner of what the industry may look for next year and will not constitute any large part of this purchasing. The return of the farmer to the market is not strongly noticeable at the present time.

Export business is doing well, with prospects that the year will show an increase over the record months of 1923. New Zealand, where conditions are fundamentally sound, is absorbing a good volume of American made cars, as are Australia and Argentina, where crops are excellent and bring good prices. Consumption by these countries is as great as a year ago, if not greater.

Export Possibilities

Aggressive sales campaigns throughout England and the Continent are forecast by the large representation of American cars at European shows. American producers expect much from the readjustment of economic conditions abroad and will devote greater attention toward producing cars for export that meet the particular requirements of the foreign market. This will provide a greater outlet for the American made product and enable the manufacturer to maintain a comparatively steady level in production the year round.

Car Manufacturers Hear Merger Plans

Bankers Outline Proposal for Holding Company to Peerless and Rickenbacker Executives

CLEVELAND, Oct. 15—Banking interests held a conference with several automobile executives here last night, at which plans were outlined by the bankers for the possible merging of three or four concerns into a holding corporation in which each of the affiliated companies would retain its identity, but which would benefit by consolidation. Present at this meeting were B. F. Everitt, president of the Rickenbacker Motor Co., and officials of the Peerless Truck & Motor Co.

Following this meeting the rumor spread that preliminary steps had been taken toward forming such a holding company which would bring together Peerless, Rickenbacker, the Gray Motor Corp. and the Trippensee Body Co., the last named controlled by Rickenbacker interests.

Investigation, however, by AUTOMOTIVE INDUSTRIES shows that nothing tangible transpired at the session. It is said that the bankers outlined a plan of how several companies might be brought together in such a combination, but that was as far as they got. None of the concerns mentioned in the rumor has taken any action in the matter. Whether or not they will at a later date remains to be seen. Up to the present all that has been done is to outline the possibilities of such a holding company.

Detroit Dubious on Merger

DETROIT, Oct. 15.—The proposition of merging Rickenbacker, Gray, Peerless and the Trippensee Body Co. into one group operating under a holding company, as reported outlined before a meeting of automobile executives and bankers in Cleveland, lacks confirmation as likely from officials of companies sup-

posedly concerned, though it is not denied that some such combination may have been discussed informally as a means of consolidating and strengthening the positions of several of the companies mentioned.

At least one of the companies is reported not to have been consulted directly in the proposition, but it does not deny that the next few months may not see its participation in some action of this kind. This particular combination, it declares, however, never has been considered up to this time and the introduction of its name into this proposed arrangement is declared unauthorized.

The proposition as reported advanced by B. F. Everitt, president of the Rickenbacker company, is regarded at this time as nothing more than a plan for consolidation under which these companies might be brought together to mutual advantage. No action looking to this eventuality has been undertaken, at least not officially by all companies concerned, it is declared, though the possibility of the plan being brought to fruition is not denied, with alterations perhaps to meet the requirements of each company.

Each of the companies mentioned under the proposal manufactures a product which is in a distinct price class and is in good financial condition or has strong financial connections. Their united production under capacity requirements would approximate 120,000 cars annually. Though each has large manufacturing facilities, they do not properly enter the heavy production group, a condition which would permit joint dealer representation of the three lines.

Combination Advantages

The advantages of the combination from a selling viewpoint are peculiarly good, a fact which gives greatest weight to the possibility of the proposed merger becoming an actuality. There are other advantages, but this undoubtedly is the factor that would be the outstanding one in bringing about a combination of forces.

Mention of the Trippensee company in connection with the merger is due largely to the fact that it is controlled by the Rickenbacker company.

Moon-Gardner Merger Still Being Discussed

NEW YORK, Oct. 16.—No further progress in the merging of the Moon and Gardner companies of St. Louis is reported, but it is said that the deal still is under consideration and that a decisive step may be taken soon.

Two meetings have been held by the interested parties, but since last week nothing more has been heard from St. Louis.

Parts Makers Assemble at Cleveland

G. B. Griffin Urges Closer Cooperation

Conservative Buying May Assure Safety but Does Not Stimulate Industry

CLEVELAND, Oct. 15 — Hand-to-mouth buying may assure safety, but it does not stimulate industry. G. Brewer Griffin, president of the Motor and Accessory Manufacturers Association, told the executives gathered at the opening session of the M. & A. M. A. convention in Cleveland today. The meeting is being attended by about 250 and will continue until Saturday.

Closer cooperation and more conferences will be necessary between parts makers and vehicle manufacturers, Mr. Griffin pointed out, if the supplier is to have a fair opportunity to balance his production schedule. The alternative to such a plan, Mr. Griffin said, is "a less sympathetic but more certain protective arrangement for the supplier, such as a definite monthly production based upon quarterly agreed schedules and 90 days' advance notice and release."

The parts makers were welcomed to Cleveland by City Manager W. R. Hopkins, who predicted that good business conditions will prevail during the next five years.

Richard F. Grant, president of the United States Chamber of Commerce, criticised business men for lack of interest in national problems and urged individual activity on the part of those engaged in management when help is needed in finding the right answer to important national questions.

Alfred Reeves Talks

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, advised those makers engaged exclusively in supplying original equipment to get into the replacement field as well with different products if necessary in order to stabilize their business.

Mr. Reeves pointed out that we now are making 25 miles of automobiles every day and that roads constitute an important marketing problem from now on. It is urgent, he declared, that parts makers get into the shows and stay out of the hotels.

More mergers are likely, he stated, but he also voiced the opinion that the desire of the public for different types of cars will make possible always a fairly large number of different companies in the automobile business. The used car problem is being solved by better understanding on the part of dealers as regards trade-in practices. A greater foreign trade activity was urged.

A dinner dance tonight opened the social activities of the convention.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Oct. 15—Industrial and trade activity continues to gain slowly. Irregularity is still apparent, however, and the upward movement has not been so pronounced as was anticipated in some lines. Railway freight, commodity prices and steel production are among the most important recent evidences of expansion.

The official crop report based on conditions Oct. 1 forecasts a yield of wheat 19,000,000 bushels greater than the estimate of the preceding month. The corn crop is now estimated at 2,459,000,000 bushels, as compared with the previous estimate of 2,513,000,000 bushels and last year's crop of 3,054,000,000 bushels.

The price of cotton broke sharply on Wednesday of last week following the publication of the official report forecasting a crop only 97,000 bales below the previous estimate. The report was based on conditions at the beginning of the month, and was distinctly more favorable than had been expected by the majority of the trade.

The production of steel ingots in September amounted to 2,814,996 tons, as compared with 2,541,506 tons in August and 3,356,776 tons in September last year. The average daily output was 108,269 tons, which compares with 97,750 tons in the preceding month and 134,271 tons a year earlier. Unfilled orders of the United States Steel Corp. at the end of September totaled 3,473,780 tons, as against 3,289,577 tons at the end of August and 5,035,750 tons on Sept. 30, 1923.

Car loadings in the week ended Sept. 27 numbered 1,087,447, comparing with 1,076,553 in the preceding week and 1,097,493 in the corresponding period last year, the latter figure being the highest weekly total ever reached. The latest total is the largest of the year to date, and loadings of grain, merchandise and miscellaneous freight are the largest ever recorded.

The production of crude petroleum in the week ended Oct. 4 averaged 2,010,450 barrels a day.

American Business to Back the South

U. S. Chamber of Commerce Plans Program of Cooperation at Kansas City Meeting

KANSAS CITY, MO., Oct. 13—The backing of American business for the continued rapid development of the South was assured by action of the board of directors of the Chamber of Commerce of the United States. The board held a bi-monthly session in Kansas City last week, adopting a program for promotion of cotton production and reduction of cost of production.

The voluminous report filed by the Natural Resources Committee, prepared by William Harper Dean, chief of the agricultural bureau, was the basis for recommendations. This report displayed vividly the enormous advance of the South in manufacturing, and also the opportunity for great increase in wealth production, through better methods of handling the cotton crops. The program for 1925, adopted, provides for a campaign for securing the cutting of green stalks in fall before frost, the planning for adequate supplies of calcium arsenate and the securing of cooperation from landlords and others to bring about recognized beneficial practices in growing cotton.

Board Outlines Views

The board disposed of the Muscle Shoals pending problem by disapproving both H. R. Bill 501 and the Norris proposal as antagonistic to the policy of the chamber and of the water power act of 1920. The board expressed its position as favoring President Coolidge's suggestion of a commission to study, conduct negotiations and make recommendations.

Improvement of postal service was discussed and a program will be worked out for action along lines covered in previous reports.

An important decision of the board was for the arrangement of a conference on distribution. No date was set for the conference, but the plan involves a very comprehensive handling of the whole situation. It is expected that a survey of the field will be included or provided for, to secure a census of distributors, data on distributive facilities, and data on the relations between manufacturers and wholesalers and retailers.

PLANT FOR ETHYL GAS

PENNSYLVILLE, N. J., Oct. 14—A \$700,000 building is being erected at the du Pont plant at Deepwater Point for the manufacture of ethyl gas. It will be five stories, 68 x 140 ft., and will be for the exclusive use of the Ethyl Gasoline Co., a du Pont subsidiary.

Australian Company Organized by Ford

Will Be Subsidiary of Canadian
Organization—Five Assembly
Plants Planned

DETROIT, Oct. 15—With the arrival in Australia early in November of a party of officials of Ford Motor Company of Canada, Ltd., the activity of the new Australian subsidiary of that company will be officially launched. The first work of the new company will be the taking over of all distribution of Ford products in that country, setting up for the first time direct factory control.

Practically simultaneously the executives will set about preparing for the building of five car assembly plants in the principal cities of the commonwealth, and the selection of a site for a body factory which will supply all five of the car plants. This work will be rushed to completion as rapidly as possible but it is not expected that complete assembly operations will be established until the expiration of a year at least.

Sees Increase in Business

In creating the new subsidiary, the Canadian company is seeking the greatest development of the Australian market. By assembling the cars and building the bodies in that country and selling them direct to dealers, it is expected to increase the annual volume of business in that country from the present 20,000 figure to 30,000 within a reasonable period.

The new company will be called the Ford Motor Co. of Australia. It will be a direct subsidiary of the Ford Motor Co. of Canada, Ltd., and will have a capitalization of \$5,000,000, all of which is provided by the parent company. The fixed investment of the company will approximate \$3,500,000 in the Australia properties, it is declared, with about the same amount invested in working assets.

While the building operations in that country are progressing, shipments from the Ford plant in Ford, Ont., will continue as formerly. Bodies will be bought for the present from manufacturers now handling this work and, if necessary, the company will supplement this supply by shipping bodies from the home plant and absorbing the heavy duties imposed.

Australian Timber in Bodies

On the completion of the plants, the Canadian company will ship completed parts, frames, etc., to be assembled into chassis by Australian workmen. All of the machining and assembling into units will be continued here, the Australian branches setting up the parts. The body plant, however, will manufacture entire-

ly from Australian timber, the resources in this respect being declared especially good.

It is expected, however, to ship all machinery for the body plant from the United States and Canada, as it will be modeled after the plants here doing this work, and the same practices and methods will be followed out. The setting up of the body plant, it is declared, will dictate the time in which full operation under the new plan will be started in Australia, as it will be practically necessary to build the plant here and then get it to Australia.

Cities in which the plants will be located are not definitely stated, but it is pointed out that distribution is centered in six cities, Brisbane, Sydney, Melbourne, Adelaide and Perth and Hobart, Tasmania. The body building plant will probably be located in Sydney or Melbourne and will supply all others either with completed bodies or sections for assembly at car plants.

Final plans on location of plants and other details will result from continued investigations following the arrival of officials. Plans as at present announced are the result of investigations which have been carried on for several years. Hubert C. French, who will be head of the Australian company, has been assistant sales manager at the Canadian plant, and has been closely identified with the Australian end of the business, making a five months' survey last year.

The investigations of the company in Australia were supplemented by a conference which Wallace R. Campbell, general manager and treasurer of the Canadian company, had with Premier Stanley Bruce of the Australian Commonwealth

(Continued on page 705)

F. Hall Marmon Killed When Automobile Skids

INDIANAPOLIS, Oct. 13—F. Hall Marmon, son of Walter Marmon, chairman of the board of the Nordyke & Marmon Co., was killed Saturday night in an automobile accident near here as he was returning from a test trip to Denver and the Rocky Mountains. A skid in soft gravel while turning out to pass another car caused the accident.

Since graduating from Massachusetts Tech, young Marmon had followed automotive practice, being in charge of experiment work for the Marmon company. He also was chairman of the committee on papers and meetings for the Indiana section of the Society of Automotive Engineers. He was 26 years old and leaves a widow and infant daughter.

STOKES HEADS ASSOCIATION

NEW YORK, Oct. 14—Robert J. Stokes, secretary of the Thermoid Rubber Co., Trenton, N. J., has been elected president of the Asbestos Brake Lining Association, succeeding M. F. Judd, vice-president of the Raybestos Co., Bridgeport, Conn., resigned. J. M. Weaver of the Keasby-Mattison Co., Ambler, Pa., has been elected second vice-president.

Stutz Is President of New Cab Company

Concern Carries H. C. S. Name
and Includes Car Making
Among Activities

INDIANAPOLIS, Oct. 14—Harry C. Stutz is president of the new H. C. S. Cab Manufacturing Co., incorporated here with a capitalization of \$1,000,000. The new concern will make and sell taxicabs, motor cars and other automotive vehicles and accessories, according to the incorporation papers. It will take over the offices and plant of the H.C.S. Motor Car Co., with the exception of realty holdings.

Two months ago the H.C.S. taxicab was announced as a medium priced, moderate sized vehicle, with extremely low operating costs. One of the new cabs was exhibited here last week at the Indianapolis Industrial Show. It is a 110 in. wheelbase job with a Ricardo type L head unit powerplant, Ross cam and lever steering and special H.C.S. rear axle.

The incorporators of the new company include Harry Stutz, H. F. Campbell, who is to be secretary-treasurer; A. G. Murdock, H. K. Grubb, A. V. Clifford, E. R. Raub, Jr., and F. E. Matson. Most of these directors have been associated in the older H.C.S. company. It is understood that production plans are well under way and that early output is expected.

According to a statement issued by the officers, the manufacture of motor cars is to continue, but the taxicab is to be the chief product of the new organization.

New England Tire Elects A. T. Hopkins President

HOLYOKE, MASS., Oct. 15—The New England Tire & Rubber Co. has elected A. T. Hopkins of Boston as its president. Other officers are: Vice-president, John Kearns, Conshohocken, Pa.; treasurer, C. S. Huntley, Holyoke; secretary, S. R. Huntley, Holyoke.

The board of directors consists of these officers and also Gen. A. F. Foote, Boston; W. W. Slack, Springfield, Vt.; Joseph A. Ranger, Holyoke; J. Sidney Bernstein, New York; S. B. Claggett, Boston; George B. Caldwell, New York.

Manager Huntley's annual report states that the company has run continuously during the past year and that plans call for an early increase from 300 tires and 450 inner tubes daily to about three times this production.

FARRAN-OLD REORGANIZED

AKRON, OHIO, Oct. 14—A reorganization of the Farran-old Co. has been completed by incorporation under Ohio laws. Greater development for Farran-old products and an increase in merchandising activities are promised.

M. A. M. A. to Exhibit at Sectional Shows

Cleveland, Kansas City and San
Francisco Now Included in
Its Program

NEW YORK, Oct. 13—Cleveland, Kansas City and San Francisco have been included in the show participation program of the Motor and Accessory Manufacturers Association. The addition of these sectional exhibits to the two national shows at New York and Chicago, and the annual affair at Boston, makes six in all on the circuit for the equipment manufacturers, all strategically located at distribution centers throughout the country. Atlanta, Ga., was to have been on the circuit on Feb. 14-21, but last week the Georgians decided not to hold any show at all and cancelled its dates.

Non-Members Included

Broadening the scope of its activities in this way, the association has contracted for preferred space in these sectional shows and will assign space to both member and non-member manufacturers of engines, parts, accessories, service equipment and kindred products. In the New York, Chicago and Boston shows the association will handle space only for its members.

Announcement of the enlarged show program is made by Neal G. Adair, manager of the M. A. M. A. show department, who, with M. L. Heminway, general manager, conducted the negotiations with the sectional show managers. The expansion followed the requests of many members to show their products in distribution centers other than the three in which they had previously exhibited. In arranging for these additional shows the association selected those in wholesale distribution centers of major importance. In all these cities are large distributors of cars, trucks and varied lines of automobile equipment.

Where Shows Will Be Held

The expanded show program covers a sweep of territory from coast to coast as shown by the following:

New York, Jan. 2-10—(National)—opening with two days of exclusive trade attendance.

Cleveland, Jan. 17-24.

Chicago, Jan. 23-31—(National)—opening with two days of exclusive trade attendance.

Kansas City, Feb. 7-14.

San Francisco, Feb. 21-28.

Boston, March 7-14.

In making the announcement, Mr. Adair says:

The merchandising power of the six shows in our 1925 program can best be appreciated by remembering they are held in the country's most important automotive distribution centers. They are all big shows, expertly managed and with good showing facilities for parts and accessories. They draw large public attendances, several of them exceeding 100,000 and all aggregating upward of three quarters of a million people.

They are attended by thousands of men

FRANCE HAS 550,000 MOTOR VEHICLES NOW

PARIS, Oct. 7 (by mail)—French automobile registration totalled 468,331 for the year 1923, this being the latest period for which official returns have been published. During the year the increase was 81,251, which is practically the same as that of the year 1922. The above total includes passenger cars and trucks, but is exclusive of motorcycles and side cars. As it is known from production figures that the number of cars increased during 1924, the total in service at the end of this year doubtless will be 550,000.

France now apparently heads the list of European countries for number of automobiles in service, for although England puts forward a bigger total, this is obtained by including 250,000 motorcycles and several thousand agricultural tractors. There are comparatively few motorcycles in use in France, and agricultural tractors are not looked upon as motor vehicles.

In the trade—distributors and dealers in cars, jobbers and retailers of parts, accessories and service equipment, service station operators and garagemen. Many car dealers are in virtually compulsory attendance at dinner rallies held by the car manufacturers and distributors during these shows. They are shows that will build business for exhibitors and in addition will draw many jobbers, specialty distributors, dealers and service men who have neither the time nor the money to visit the national shows.

Convention Scheduled by Parts Association

BUFFALO, Oct. 13—The recently formed National Standard Parts Association, whose temporary headquarters are located at 901 Washington Building, this city, announces that its first convention will be held at the La Salle Hotel, Chicago, Nov. 6-8.

This session will be devoted to the setting up of a permanent organization, and because of this the association will not stage a show, as had been contemplated. Instead the convention will adopt a constitution and by-laws, elect officers and definitely outline the work it hopes to do.

Affairs of the association now are being handled by C. B. Fraser, formerly of the King Manufacturing Corp., who has succeeded Anton Johannsen as secretary. The membership continue to grow, and to date the association has 38 jobber members and 20 manufacturers.

BERKSHIRE PRODUCTS SALE

PITTSFIELD, MASS., Oct. 15—Machinery and equipment of the Berkshire Products Co. were sold at auction Oct. 10 for \$19,500. The company's real estate holdings are still in the market.

G. M. C. Reports Sales Conditions Reversed

Last Month Deliveries to Dealers
Increased Over Those Made
at Retail

NEW YORK, Oct. 13—So far as General Motors units were concerned, September reversed sales conditions in August. Whereas in the latter month retail deliveries were greater than deliveries to distributors and dealers, in September dealers took the majority of the cars produced.

The monthly report issued by General Motors shows that in September consumers accepted deliveries of 49,188 cars, while dealers bought 52,106 units.

For the nine months' period there has been a decrease of 7.52 per cent in deliveries to consumers, compared with the same period in 1923. Totals for the first three quarters of the year are: Consumers, 543,924; dealers, 494,382.

Report for Nine Months

The report for the first nine months of 1924 and for corresponding periods in 1923 and 1922 follows:

	1924 Sales to Dealers	Retail Sales
January	61,398	33,259
February	78,668	50,008
March	75,484	55,845
April	58,600	89,610
May	45,965	84,686
June	32,934	66,146
July	40,563	60,275
August	48,614	54,871
September	52,106	49,188
Total	494,382	543,924

	1923	
January	48,162	30,464
February	55,427	41,448
March	71,669	74,137
April	75,822	97,667
May	75,393	89,317
June	69,708	95,962
July	51,634	63,209
August	65,999	55,832
September	69,081	61,111
Total	583,895	588,137

	1922	
January	16,038	11,520
February	20,869	14,795
March	34,082	26,615
April	40,474	48,353
May	46,736	51,983
June	48,541	47,058
July	33,372	32,000
August	42,840	43,452
September	35,443	34,632
Total	318,845	313,408

Flint Motor Celebrates Its First Anniversary

DETROIT, Oct. 14—In celebration of the first anniversary of the start of production at Flint Motor Co. a dinner party was held at the Durant Hotel, Flint, attended by 200 executives and assistants of the company. W. E. Holler, vice-president and general manager, was the principal speaker and Charles Turner, assistant to Mr. Holler, presided. Other speakers were C. J. Whitacre, chief engineer; Warren Farr, factory manager, and Frank Stern, comptroller.

Atlantic Is Crossed by ZR-3 in 81 Hours

Giant Airship Built in Germany
for U. S. Reaches Here
Without Mishap

NEW YORK, Oct. 15—The ZR-3, the dirigible airship which Germany built for the United States, successfully completed its trip across the Atlantic from Friedrichshafen, Germany, where it was built, arriving at Lakehurst, N. J., at 9:52 a.m. today. The ship started on its trip at 6:25 a.m., German time, Oct. 11.

The giant airship came through without mishap, with the exception of a rent in the gas bag which was easily repaired. The journey of 5060 miles was successfully accomplished in 81 hours.

The completion of the trip marks the transfer of Zeppelin dirigible manufacturing activities to this country, for the Goodyear-Zeppelin Co., which several months ago obtained exclusive rights for all of North America to the German Zeppelin patents, now is in control.

Twelve of the experts who came over on the ZR-3, headed by Dr. Carl Arnstein, chief Zeppelin designer, will move on to Akron next month to superintend the manufacturing operations of the Goodyear subsidiary, a large semi-rigid dirigible which will act as a mother ship for airplanes now being under way.

Bus Service May Join Many Michigan Cities

DETROIT, Oct. 14—The establishment of through bus service to most of the important cities in the lower part of the State is planned by the Peoples Motor Coach Co. under the terms of a proposal filed with the State Public Utilities Commission in Lansing this week. The Peoples Motor Coach Co., though not specifically identified with the Detroit United Railways under the application, is understood to be a newly formed subsidiary which will undertake the operation of auxiliary bus lines.

The routes outlined to the commission under the proposal are: Port Huron to Grand Rapids, Detroit to Ann Arbor, Detroit to Trenton, Lansing to St. Johns, Detroit to Flint, Detroit to Mount Clemens and Port Huron, Port Huron to Bad Axe and Point aux Barques, Flint to Toledo by a route not touching Detroit.

The Port Huron to Grand Rapids route would traverse the State east and west from Lake Huron to within 20 miles of Lake Michigan, a difference of about 120 miles. This route would open much country at present not served by electric lines. The direct route, Flint to Toledo, in addition to opening new territory, also would reduce travel between these points by several hours by staying outside of Detroit.

Under its plan the company would take over all existing bus lines on routes which it proposes to operate, these for

FORD DELIVERS CARS IN FORMER WARSHIP

DETROIT, Oct. 15—Transformed from an agent of war, a former German warship operated by a Hamburg company is now transporting Ford products to dealers served by the Ford Motor Co. of Copenhagen, Denmark. The Ford transport, rechristened "Aegir," was outfitted especially for transporting complete vehicles. It has four decks with a capacity for 300 cars, with two elevators for moving cars from lower decks.

The cars are run aboard under their own power from the plant direct to the ship and are braced and blocked in stalls on each deck. Gasoline, oil and water remain in the cars, eliminating all unnecessary handling at origin and destination.

the most part being operated only between intermediate points. By establishing through service much of the traveling delays now occasioned by changing from one line to another would be eliminated, the company claims, and service and equipment would be standardized to the greatest advantage of the patron.

Electric Vehicle Show Being Held in New York

NEW YORK, Oct. 14—Exhibits of electrical vehicles and equipment will form part of the Electrical and Industrial Exposition to be held in Grand Central Palace, Oct. 15 to 25. About half the second floor will be given over to the automotive field, and the vehicles shown will include industrial trucks and tractors, light delivery wagons and heavy duty trucks.

Exhibitors in this section include the Autocar Sales & Service Co., Commercial Truck Co., Electruck Corp., O. B. Electric Vehicles, Inc., Walker Vehicle Co., Ward Motor Vehicle Co., Baker R and L Corp., Edison Storage Battery Co., Electric Storage Battery Co., Otto Sarvas, General Electric Co. and the Automobile Bureau of the New York Edison Co.

Transport Is to Be Sold If It Is Not Reorganized

MOUNT PLEASANT, MICH., Oct. 13—Under a Federal Court ruling the Transport Truck Co. of this city will be sold under the hammer Dec. 6 unless steps are taken to reorganize and rehabilitate the company before that time. Delay in the sale of the assets, it has been represented, means a dwindling at the rate of from \$3,000 to \$5,000 a month.

Net operating loss from March to September inclusive was \$10,000, the receiver reported, and the total loss, including \$19,000 in taxes, was \$29,000.

Ford Will Not Press Muscle Shoals Plan

Says He Has Abandoned Efforts
to Get Property—President
Optimistic, However

WASHINGTON, Oct. 14—Henry Ford's announcement, made through the press this week, that his company would make no further efforts to purchase or lease Muscle Shoals, is the first intimation in Government circles here that he had tired of the years of Congressional delay in accepting his \$5,000,000 bid.

President Coolidge does not consider that Mr. Ford is definitely out of the market for the property. The President rather considers, he told a representative of Automotive Industries at the White House today, that Mr. Ford has merely decided not to press at this time for Congressional acceptance of his offer, but to await future developments.

Ford's announcement through the press was the first knowledge of his action that the White House had received, it was stated. There has been no word received from Mr. Ford by the War Department, under whose jurisdiction the project is located, it was declared. Neither had Congressional committees considering the offer of Mr. Ford been advised of his intent to withdraw his bid.

Supporters of the Ford offer had planned to bring up the Muscle Shoals question as soon as Congress convenes in December, agreement having been reached to take up the Ford bill in the Senate ahead of any other business. It is expected now, however, in view of the new position taken by Mr. Ford, that Congress will turn its attention to the authorization of the impartial commission, as recommended by President Coolidge, to take up the Shoals problem.

435,500 Fordsons Made Since Production Began

DETROIT, Oct. 11—Since start of production of Fordson tractors, seven years ago, the company has built 435,500 of these units, and has brought the price from the \$750 figure originally set to \$495 today.

Featuring the 1924 demand, the Ford Motor Co. reports, is a 50 per cent increase in export sales over the same period in any previous year. Russia, Australia, Argentine and Chile are among the recently opened markets.

FORD PLAN ENROLLMENTS

DETROIT, Oct. 11—In the year and a half, up to Oct. 8, that the weekly payment plan of the Ford Motor Co. has been in effect, there has been a total of 401,181 enrollments, the company reports, and from this number 131,156 cars have been delivered.

Men of the Industry and What They Are Doing

Kettering and Hayes Go to Europe

Charles F. Kettering, president of the General Motors Research Co., and C. B. Hayes, president of the Hayes Wheel Co., are among the automotive executives who are en route for Europe to visit the Olympia show.

Bendix Visits Foreign Shows

Vincent Bendix, president of the Bendix Engineering Co. and the Perrot Brake Corp., is in attendance at the foreign shows, studying the advancement made in four-wheel brake construction.

Curl Is General Purchasing Agent

L. C. Curl has been appointed general purchasing agent of the Continental Motors Corp. with headquarters at the Detroit plant. Mr. Curl has been with Continental for the last nine years, recently serving as purchasing agent at the Muskegon plant. In his new position he will be in charge of purchases, procurements and traffic.

Kincaid and Mismar Promoted

F. M. Kincaid has been appointed chief engineer of the Commerce Motor Truck Co., and N. T. Mismar has been appointed service manager. Both men have been members of the Commerce organization for a number of years, the new appointments being in recognition of special achievement.

F. E. Brown with Smith Company

F. E. Brown has been placed in charge of engineering and production of Joseph N. Smith & Co. of Detroit. Mr. Brown long was connected with the Troy Sunshade Co. of Troy, Ohio, and in 1918 joined the executive staff of the Zenite Metal Co. Mr. Brown will become an officer and director of the Smith company, which is planning to expand the operations of its windshield division in its recently acquired Federal Avenue plant in Detroit.

Helber Made Plant Superintendent

Walter Helber has been appointed general superintendent of the plant of the recently organized Ajax Motors Co., a Nash subsidiary. Mr. Helber has been in the industry since 1907, coming up from the bench to his present position.

Tweedy and Mowe Form Company

O. S. Tweedy and John V. Mowe have formed Tweedy-Mowe, Inc., which will act as selling agent for several tire manufacturers, establishing salesmen at various distributing points over the country. The company's first account is that of the McKone Tire & Rubber Co. Both the principals are well known in the industry. Mr. Tweedy was for 10 years western sales manager of the Diamond

Rubber Co., 10 years with the United States Rubber Co. as eastern district manager and assistant general sales manager, and for the last three years vice-president and general manager of the McKone company. Mr. Mowe came into the tire industry in 1905, and after long service with Firestone and Good-year became identified with the Kelly-Springfield Tire Co., serving five years as assistant manager and three years as director and vice-president in charge of sales.

Pritz With United Alloy Steel

L. G. Pritz has been appointed vice-president in charge of all operations of the United Alloy Steel Corp. Mr. Pritz is one of the oldest electric furnace men in the United States. His start was with the Illinois Steel Co. in 1909, and in 1917 he became associated with the Timken Roller Bearing Co. He was general superintendent of the steel works when he became associated with the Sizer Steel Corp. of Buffalo as vice-president, specializing in the production of bar steel, die block steels, tool steel, bit steel and alloy steels for automotive parts.

A. H. Blanchard with State Highway

Arthur H. Blanchard, professor of highway engineering and highway transport at the University of Michigan, has been appointed consulting engineer of the Michigan State Highway Department.

Hermann Joins Field Body

E. J. Hermann, formerly with the Martin-Parry Corp. and recently with the Continental Car Co., has joined the Field Body Corp. of Owosso, Mich., as supervisor of distribution.

H. H. Grubb Resigns

H. H. Grubb, who has been general sales manager of the Victor Rubber Co. at Springfield, Ohio, for the last few years, has resigned to join the Real Silk Hosiery Co. of Indianapolis as district manager. Besides holding the office of president, H. S. Berlin has assumed the position of director of sales. C. W. Hamilton, formerly with the National Cash Register Co., Dayton, has been placed in charge of sales promotion.

McMeans Oakland District Manager

A. L. McMeans has been appointed district manager for the Oakland Motor Car Co. on the Pacific Coast. He will have his headquarters in San Francisco and will direct the field activities of this, the largest Oakland sales district, comprising the States of California, Nevada and Arizona. His appointment by C. W. Matheson, vice-president and director of sales of Oakland, renews a business association for many years, as Mr. Matheson

3 to 6 Per Cent Cut Made in Tire Prices

Affect High Pressure Cords— Firestone Starts Move and Other Makers Follow

NEW YORK, Oct. 15—A reduction of from 3 to 6 per cent on high pressure cords by all the leading manufacturers was announced today. The 3 per cent applies to the larger sizes and the 6 per cent to the smaller ones.

The Firestone company started the ball rolling and before the day ended all of the other leaders had followed suit. The cut came as a surprise to both the industry and the public, for with rubber soaring in price as it is and with most of the plants running near capacity, advances rather than reductions were expected. In fact, several of the smaller companies increased prices a few weeks ago.

Reasons for the Firestone action have not been given out, but one shrewd critic in the industry declares that it is a move on the part of Firestone to meet the competition of the semi-balloon type. Firestone does not make semi-balloons, which are near the high-pressure cords in price, so it is said that by reducing as he has done he widens the price gap between the two types. This is done, it is declared, for the purpose of popularizing the high-pressure cords and making the price distinction all the more prominent.

Others hold that the reduction is but temporary and that higher prices must come later on.

was vice-president in charge of sales for Dodge Brothers at the time Mr. McMeans was executive secretary of that organization. Mr. McMeans was in charge of Dodge Brothers' finances and accounting for 14 years. For the last three years Mr. McMeans has been president of the Michigan Lubricator Co. of Detroit.

John Baker, Jr., Sales Director

John Baker, Jr., formerly branch manager of The Kelly-Springfield Motor Truck Co. at Chicago, has been appointed director of sales, with headquarters in Springfield, Ohio.

MERGER PLANS APPROVED

BOSTON, Oct. 15—The proposed consolidation of the American Bosch Magneto Corp. and Gray & Davis has been approved by the shareholders of the latter company who will exchange their stock for shares in the Bosch company. This action was taken at a special meeting held today.

Store-Door Delivery Principles Approved

**Merchants' Association Indorses
Them and Committee Pre-
sents Its Views**

NEW YORK, Oct. 13—Five principles that must be observed in the installation of the store-door delivery system have been approved by the board of directors of the Merchants' Association. In the opinion of the board store-door delivery must be optional, the carrier must be responsible, shippers and receivers must bear the cost, the trucking charges must be fair and the establishment of the system should take place gradually.

These are the same set of principles which already have been indorsed by the Atlantic States Regional Advisory Board and by other commercial organizations. The approval by the Merchants' Association board comes after an investigation by its Transportation Committee, which, in its report, gives its views on each of the five principles as follows:

Summary of Principles

1. It is the practice in all countries where store-door delivery is made in connection with rail service to give the shipper and consignee the option of handling their own freight from the rail terminal. The necessity for this arises in some cases from the peculiar character of the merchandise. In other cases the shipper or receiver can perform the service cheaper than can the railroad. There are certain commodities which require specialized handling, and it will be neither advantageous to the shipper nor economical to the carrier to entrust the handling of such commodities to inexperienced truckmen.

2. In all countries where store-door delivery has been successfully tried, the carrier assumes full responsibility for its truckmen between its terminal and store door. This service must be an extension of the rail service, and it cannot be made successful unless the carrier assumes full responsibility for the agent it selects for the performance of this additional terminal service. If the shipper is to be responsible for the safe conduct of his goods between the railroad terminal and his place of business, it is only natural that he should desire to select a truckman in whom he has confidence and over whom he has some measure of control. In the opinion of your committee this provision is fundamental.

Cost Should Be Additional

3. The cost of making store-door delivery should be in addition to the station to station rate. The carrier should not be expected to assume the expense.

4. The charge for the service must be such as to attract the business to the carrier. The charge should reflect the advantages to the carrier of increased terminal flexibility. Unless the trucking charge is at least as low as the present cost to the shipper or consignee your committee believes there will be no inducement to the shipper or consignee to entrust this service to the carrier. Any attempt on the part of the carrier to profit on the terminal

service will defeat the object to be obtained.

5. Any attempt to establish store-door delivery in a wholesale way will, in the opinion of the committee, fail; it should be undertaken only at those points where there is obvious need of increased terminal facilities for the handling of less than car load freight. Its establishment should be gradual, and in the opinion of your committee, it should be tried out in some of the smaller cities before attempting to put it into effect at the great markets. This recommendation is made upon the assumption that in its experimental stage some changes will have to be made and the carriers will gradually develop this method of handling less than carload business, so that when it is established in the larger cities, the experimental stage will have been passed to a large extent.

Work Begins on Plant to Make "Balboa" Car

FULLERTON, CAL., Oct. 14—The Balboa car is now about ready to start production, having undergone over eight years of preparation and experiment. Work has been started on a modern factory and it is hoped that the first models will be coming through by the beginning of the year. Plans contemplate building 1000 cars next year.

The Balboa is a supercharged engine design with eight cylinders in line, overhead camshaft and piston displacement of 178 cu. in. Supercharging is accomplished by compressing the charge in a special pocket in the crankcase on the downstroke of the piston.

Officers of the company include O. W. Heins, president; W. H. Radford, vice-president and chief engineer; F. G. Mott, Jr., vice-president and sales manager.

Wills Builds Town Car Pricing It at \$5,500

MARYSVILLE, MICH., Oct. 15—Wills Sainte Claire has added a town car to its line of bodies. It is a de luxe model all the way through, finely finished and luxuriously appointed. The body is custom built. The price is \$5,500.

HUFF LOSES TO FORD

WASHINGTON, Oct. 14—The Supreme Court has refused to consider the suit of Edward S. Huff against Henry Ford for \$11,000,000 royalty on the Ford magneto. Mr. Huff claimed to have been paid \$10,000 by Mr. Ford for the invention, but he also asserted he was to receive \$2.50 for each magneto used on 4,500,000 cars. In the lower Federal courts it was held that Mr. Huff had neglected to press his claims within the time allowed by law.

STOCK CAR RUN IN FRANCE

PARIS, Oct. 9 (by mail)—A distance of 1551.56 miles has been covered in 24 hours by a stock four-passenger 122 cu. in. Rolland-Pilain car, driven on the new 1½-mile race track near Paris by a team of four men. The time of the year was against the attempt, which was rendered more difficult by rain.

Committee Selected to Work with A. A. A.

**Will Aid Truck and Bus Branch
—N. A. C. C. Appoints David
C. Fenner Chairman**

NEW YORK, Oct. 13—David C. Fenner of Mack Trucks, Inc., and head of the Motor Vehicle Conference Committee, has been appointed chairman of the National Automobile Chamber of Commerce committee which will cooperate with the American Automobile Association in the formation of divisions for the truck and bus owners and bringing them into the A. A. A.

Mr. Fenner's associates will be T. R. Dahl, vice-president of the White Co., and F. C. Horner, manager of Railroad Transport, Engineering Department, General Motors Corp. This committee will get into action at once, and a conference with President Thomas P. Henry and General Manager Ernest N. Smith of the A. A. A. will be held soon.

Active work in this promotion has been held up awaiting the appointment of the N. A. C. C. committee, but tentative plans for the promotion work already have been made. It is proposed to have two divisions instead of bunching bus and truck owners under one banner, and the recruiting for membership at the start will not include going after the unaffiliated owners. Instead it is planned to interest the associations of owners already formed and not yet brought together in any national organization.

There are approximately 80 such organizations throughout the country, representing perhaps about 18,000 owners. A questionnaire sent out brought responses from more than 50, representing 12,000 owners. Most of these are either haulers or contractors, with few fleet owners in the lineup. It will be the aim of the organizers to go after the fleet owners, and with a small army of them eligible it is expected that a strong branch of the A. A. A. soon can be organized.

Enrollment under the A. A. A. banner will not destroy the individuality of these associations.

New FWD Truck Model Shows Many Changes

CLINTONVILLE, WIS., Oct. 14—The Four Wheel Drive Auto Co. is bringing out a new FWD truck which is similar to the regular standard Model B 3-ton chassis but with many improvements including the conversion of the seat frame into a two-piece assembly, increasing the engine base capacity to 10 qt., increased strength of springs and some new features in the power plant.

The intake manifold now has a hot spot and a Stromberg M-2 carburetor is used. Many other minor changes in design have been made in the chassis.

Canadian Ford Nets \$5,719,187 in Year

Is Gain Over Corresponding
Period in 1923 and Equals
\$53.13 a Share

DETROIT, Oct. 13—With a sales record of 83,952 units for the year ended July 31, 1924, compared with 70,328 in the preceding 12 months, the Ford Motor Co. of Canada, Ltd., reports a net profit of \$3,719,187 for the period, as against \$5,106,197 in the preceding year. This is equivalent to \$53.13 a share earned on \$7,000,000 outstanding capital stock, against \$72.94 a share in the preceding year.

In its balance sheet assets of \$34,460,975, against \$32,971,903 in 1923, are reported, of which \$21,446,938 represents real estate, plant, equipment, etc.; \$6,143,170, cash, and \$4,652,940, inventories. Profit and loss surplus on July 31, last, was \$19,609,861, compared with \$16,594,170 at the close of the previous fiscal year.

In its annual report the company states that its construction program, started November, 1922, has been substantially completed, and that practically all operations have been transferred to the new plant, the former one having been turned over to the body division.

Company in Australia Is Organized by Ford

(Continued from page 700)

in London during the Imperial Conference of last November. With the preliminary details complete, the seal of approval was placed on the plan at the directors meeting of Ford of Canada this week and announcement followed.

In his statement of the plan to form the Australian company, Mr. Campbell said:

For a number of years the Ford Motor Company of Canada has been doing business throughout Australia through the medium of distributors located in six principal cities. Australia is approximately the size of Canada and has a population of about six million, 98 per cent of whom are British born.

The Australian tariff structure has practically prohibited the importation of automobile bodies, with the result that the manufacture of bodies in the country was found necessary. This started during the war when ocean cargo space was at a premium and the Government decided that although chassis might be admitted, bodies could not be carried. The result is that a body manufacturing business has been built up in Australia.

The weakness of this situation, however, from our standpoint, is that the price of the body made now by our distributors, practically controls the price of our product, a condition that is economically unsound, and not in accordance with the company's established product. The tariff on automobile bodies is practically prohibitive. It amounts specifically to 75 pounds sterling on a closed car and 60 on a touring model.

As things are going it means that we are paying body manufacturers to carry out a function that is essentially our own. The structure as it stands is beyond reproach but the structure is wrong. We have no criticism to make of distributors who are making the bodies but the present system is not the way we like to do business. We have outgrown this system. Our tendency is to go directly to the market and not through a middleman.

The location of five assembly plants instead of one great central plant is explained by Mr. Campbell as necessary because of lack of interstate railroad transportation. Seven different gages of track make it necessary to do most of the interstate shipping by coastal steamers. This has the effect of making it necessary to establish separate plants at strategic points.

As indicating the importance of the Australian market to the Canadian company, Mr. Campbell pointed out that approximately 20,000 vehicles, or 40 per cent of the Canadian output last year, was shipped to that country. With the growth of the population and agriculture in that country, Mr. Campbell said, Australia offers an attractive market and a substantial future.

The establishment of the Australian company follows the recent opening of a South African assembly branch at Port Elizabeth and the completion of the expansion program at the Ford plant in Ontario. With this plant now organized to produce up to 1000 cars daily, the company is building up its distribution to take care of large output. No other foreign branches or companies are contemplated now, Mr. Campbell said, the financing of the Australian company representing a peak, for the present, of its operations.

The party that will sail to complete arrangements in Australia will be headed by P. W. Grandjean, secretary of the Ford Canada company, and Mr. French. In all 25 to 30 members of the Canadian organization will go to Australia in the near future to become members of the organization there.

Ford to Use More Boats for Exports to New York

DETROIT, Oct. 14—Plans under consideration by the Ford Motor Co. contemplate a much more extensive use of boats for carrying export shipments to New York from the Detroit plants. Boats now chartered and now in operation with lighter cargoes will carry full capacity through the Erie Canal for transshipment at New York to European and South American steamers.

Two steamers are now being used in this service between the River Rouge plant and New York via the Erie Canal, one leaving each week. The first left Sept. 15 carrying a 700-ton cargo for six European and South American destinations. The other followed with a cargo of nearly 600 tons. These cargoes are made up of body parts, engines and other parts used in the assembling of Ford cars and trucks. Fully assembled tractors are also included.

Balloon Inventories Advanced in August

Rubber Association Members Report 756,002 on Hand, Against 715,002 in July

NEW YORK, Oct. 13—Statistics compiled by the Rubber Association of America, inclusive of practically all the manufacturers except Firestone, show that in August production of tires exceeded shipments, and that this August was ahead of the corresponding month last year in production and shipments.

High pressure cords returned production figures of 1,983,530, as against 1,632,380 in July and 1,389,703 in August, 1923. Shipments totaled 2,663,087, against 2,148,581 in July and 1,532,419 in August, 1923. Inventories were decreased, this August showing 2,679,205, against 3,028,785 in July and 4,026,140 in August, 1923.

Balloons jumped from 365,213 in July to 501,166 in August in production, with shipments increasing from 393,572 to 435,572. Inventories also advanced, going from 715,002 in July to 756,002 in August.

Production of fabric casings increased from 554,736 in July to 750,045 in August, but slumped from 966,212 in August, 1923. Shipments were 1,094,455, against 1,019,397 in July and 1,319,615 in August, 1923.

For the first eight months of this year production of high pressure cords totaled 14,720,295, slightly in excess of the 14,180,711 in the corresponding period of last year. Shipments totaled 15,387,921, against 12,527,992. Balloon tire production in the same time this year was 2,554,154, with shipments of 1,805,004.

New York Moves Traffic Like Working of a Loom

NEW YORK, Oct. 15—Something new in the way of traffic control has been adopted by the Police Department, which hopes to have it in operation within a few weeks. The innovation is a new electric signal system which will move traffic in the manner of a weaver's loom. When it is in operation, all east and west bound traffic in the congested zone will be moving, while north and south bound traffic will be stopped, and vice versa.

The new signal posts will be placed at four block intervals on all the north and south thoroughfares, except Fifth Avenue, which will continue to use the successful tower system inaugurated several years ago. Control will be from a master tower. The installation of the system will cost \$250,000.

In addition to this, in its efforts to relieve traffic congestion, the Police Department has installed one-way traffic in every east and west street from Bowling Green to Fifty-ninth Street, and also has ordered that there shall be no parking of more than an hour's duration in the public parking station.

\$3,163,327,874 Value Put on 1923 Output

Government Reports That Passenger Car Production Was Worth \$2,277,800,046

WASHINGTON, Oct. 14—The Department of Commerce announces that according to data collected at the biennial census of manufacturer, 1923, the establishments engaged primarily in the manufacture of motor vehicles in that year produced 3,472,420 gasoline or steam-driven passenger vehicles, including chassis, valued at \$2,277,800,046; 12,878 public conveyances, valued at \$24,667,251; 1192 Government and municipal vehicles, valued at \$10,051,776; 402,408 business vehicles, including chassis, valued at \$295,868,451; 1236 electric vehicles, including chassis, valued at \$3,059,906, and 11,191 trailers, valued at \$4,233,069, together with other products valued at \$547,647,375, making a total of \$3,163,327,874.

This total represents an increase of 89.3 per cent, as compared with 1921, the last preceding census year. The output of motor vehicles of all classes, including chassis, totaled 3,890,134 in number and \$2,611,447,430 in value. The values here given are f.o.b. factory.

The foregoing figures and the other statistics relate to manufacturers whose chief products were assembled motor vehicles, and do not include data for the production of establishments engaged primarily in the manufacture of bodies, parts and accessories for motor vehicles.

The proportion of closed passenger cars increased from 10 per cent in 1919 to 21.6 per cent in 1921 and 35.1 per cent in 1923. The number of this class of motor vehicles, not including electric cars, manufactured in 1923 reached a total of 1,201,316, compared with 303,687 in 1921 and approximately 156,000 in 1919.

San Sebastian Race Won by 6-Cylinder Sunbeam

PARIS, Oct. 7 (*By Mail*)—Handling the 122 cu. in. supercharged six-cylinder Sunbeam, H. O. D. Segrave won the San Sebastian 386-mile road race at an average speed of 63½ m.p.h. The race was held on an 11 mile winding circuit, which was rendered dangerous by reason of heavy rain for several hours before the start.

There were several accidents due to the state of the road. On the eleventh round, and while among the leaders, K. Lee Guinness on a Sunbeam skidded to one side of the road, struck a boulder hidden by the grass and then shot into a wall on the opposite side. Both men were catapulted out of the car, thrown over the wall and down a steep embankment, the mechanic, Barrett, being killed on the spot and Guinness sustaining a broken arm.

Being too high geared for the prevailing conditions, Segrave made the entire race on second and third gears. One of the twelve-cylinder Delages, driven by Benoist, was fitted with an indirect fifth gear, which gave it an advantage until it struck a retaining wall.

There were 14 starters in the race, the firms being Sunbeam, Delage, Mercedes, Bugatti and Diatto.

FINANCIAL NOTES

Borg & Beck Co., Moline, Ill., has certified to the Secretary of State to an increase in capital stock from 100,000 shares of no par value to 125,000 shares of no par.

Kelsey Wheel Co. has declared its regular quarterly dividend of \$1.75 on the preferred, payable Nov. 1 to stock of record Oct. 20.

Unusual Rules Govern French Speedway Race

PARIS, Oct. 7 (*By Mail*)—Unusual rules have been adopted for the first big race to be held on the new French 1½-mile concrete speedway at Monthery, a few miles south of Paris. A 621-mile race is announced for Sunday, May 17, with 250,000 francs in cash prizes.

Cylinder bore will be limited to 2.7 in., with a stroke which probably will be between 3.9 and 4.3 in. Number of cylinders is limited to eight; connecting rod bearings must be plain; not more than two ball or roller bearings can be used for the crankshaft, but the number of plain bearings is unlimited.

Supercharging is not allowed. Number of valves is limited to two per cylinder; substitutes for the poppet valve are allowed. Weight and body styles are unrestricted, but there will be a minimum internal width and a maximum length of tail.

Cleveland S. A. E. Fixes Its Program for Year

CLEVELAND, Oct. 22—The Cleveland section of the Society of Automotive Engineers announces its program of meetings for the year as follows:

Oct. 20—Prof. C. A. Norman of the Ohio State University will talk on the present designs and trend in European automotive practice.

Nov. 18-19—The Section will concentrate its energies in having its members attend the joint service meeting of the S.A.E. and the N.A.C.C.

Dec. 15—Ernest E. Wemp of the Long Manufacturing Co. will talk on development of clutches.

Jan. 19—Arthur H. Denison of the Weger Motor Co. and possibly Thomas Midgley, Jr., will talk on the preparation of fuel charges and detonation.

February—J. H. Hunt of the General Motors Research Corp. will discuss electrical instruments and measuring of chassis tests by means of them.

March—Harry Horning, president of the Waukesha Motor Co., will talk on road and riding ability.

April—Probably a member of the Goodyear Tire & Rubber Co. will talk on design and construction of the new Goodyear Zeppelins.

May—Is open at present, but this will probably be a talk on tubular front axles.

Meetings are held the third Monday evening in the month, Old Colony Club, Hotel Cleveland.

Fords Act as Hosts to Prince of Wales

Meets Leading Citizen of Detroit
and Witnesses Assembling
of Car

DETROIT, Oct. 15—Henry and Edsel Ford entertained the Prince of Wales during a 12-hour visit to Detroit Tuesday, the entertainment being mostly of a social nature, though including brief trips through the Highland Park, River Rouge and Lincoln plants of the Ford Motor Co.

As the guest of Henry Ford the Prince met a number of leading citizens at the Detroit Club, among whom were several closely identified with the automotive industry. In the evening, as the guest of Edsel Ford, the Prince was entertained at a dinner and dance.

The principal feature of the trip through the factories was the assembling of a special Ford car by a crew of picked workmen; upon completion of the car it was presented to him. Leaving the Highland Park plant he was whisked to the River Rouge and then to the Lincoln plant.

At the Detroit Club, where a buffet supper was served, Henry Ford had invited, among others, Senator James Couzens, Alvan Macauley, Harold H. Ammons and others of the older business men of the city. From there the Prince went to the Edsel Ford home, following a brief stop at the Detroit Athletic Club for a change to formal dress.

The dinner and dance here was attended principally by younger people.

Leaving the Ford home early Thursday morning the Prince was taken across the Detroit River on the Ford steam yacht and boarded his special train in Windsor for Toronto.

Another Company Asks New York Bus Rights

NEW YORK, Oct. 15.—The thirty-sixth application for a franchise to operate buses in Manhattan and the Bronx has been filed with the Board of Estimate. The newcomer is the Peoples' Electrobuses Corp., 44 Wall Street, which asks for a 25-year franchise to operate at a 5 cent fare, with a 2-cent transfer privilege. It offers the city 10 per cent of its profits and the city can take over the system after five years.

George W. Loft, head of the Loft Candy Co., is president of the corporation which has been capitalized at \$100,000. It is intended to use electrically operated buses, fitted with an electrical drive, the patents for which are held by the Trackless Trolley Corp. Charles A. Berg, representing the latter company and formerly general manager of the Commercial Truck Co. of Philadelphia, is a member of the board of the electrobuses corporation.

METAL MARKETS

Disorder continues to be the steel market's outstanding feature. Just as much business is probably being placed as there would have been, had the abolition of the "Pittsburgh plus" price basis not jolted the market out of its rut, but this merely emphasizes the utter dependence of most consumers upon current mill shipments because they lack even a modest reserve stock. It makes no difference whether a purchasing agent believes that the prevailing confusion will eventually result in higher or in lower prices when he must order steel every week so that his plant may be kept going the next. Most of the recent buying has been of this character.

Youngstown mills a few days ago sold full-finished automobile sheets \$2 a ton lower than previously, naming 4.50 cents. There is now a Worcester (Mass.) base price on cold-rolled strip steel: 4.15 cents. The Pittsburgh base price is 4 cents. The smaller independents are thoroughly stirred up by the situation which the dislocation of prices has brought about and some go so far as to charge the leading interest with having brought it about for its own benefit. According to the best market opinion, a return to previously prevailing conditions is utterly out of the question. The Federal Trade Commission could not undo what it has done.

There will be a meeting of the American Iron and Steel Institute held at New York next week, and it is quite likely that Judge Gary on that occasion will give some inkling as to the industry's future policy with reference to its price structure. For the present the smaller independents are meeting all competition seeking to encroach upon their regular trade. Not much importance is attached to rumors of impending mergers. Some of these may materialize, but they will not affect the tripartite character of the industry: the leading interest, the large independents, and the smaller independent mills.

The leading producer in the past has always followed the policy of furthering the entire industry's best interests by conserving the prosperity of the smaller independents. The latter are worth just now, but when developments clearly show what is the best way out of the present confusion, they will follow the lead of the chief interest, as they have always done in the past.

Pig Iron.—The market for foundry and malleable irons is dormant and prices are unchanged. Blast furnace men say they are not very eager for sales at prevailing levels as they are merely getting a new dollar for an old one.

Aluminum.—Offerings of imported metal are as scarce as hens' teeth, and the domestic producer virtually has the field to himself. Latest Paris advices state that the French manufacturers of aluminum recently advanced the ingot price to 1000 francs per kilo, the equivalent of approximately 23 cents a pound, consumers protesting loudly at the return of the high levels of 1920. The French home demand is so strong that one of the largest producers is rationing foreign customers. This system of allotments holds true of all European shippers.

Copper.—Producers have recanted and are once more publishing statistical reports, those of mine output monthly and of shipments and refinery output quarterly. The latest returns show considerable addition to surplus which offsets improved conditions in the chief European consuming centers.

Tin.—After many ups and downs, tin is once more hovering around 50 cents. Consumers are buying in a routine way.

Lead.—The market is holding very steady. Storage battery demand is fair.

September Sales Fell
in New York District

NEW YORK, Oct. 13—A further decline in registration in the metropolitan district is reported for September by Sherlock & Arnold, publisher of the Automobile Sales Analysis.

In the three quarters of this year 73,264 low and medium priced cars were registered, as against 66,612 in the corresponding period of 1923 and 54,023 in that of 1922.

Registrations of higher priced cars totaled 5318 in the nine months of this year, compared with 6548 in 1923 and 5581 in 1922.

Recapitulation by months for the three years follows:

Low and Medium Priced Cars			
	1922	1923	1924
January	2,014	2,803	3,548
February	2,230	2,775	3,814
March	6,352	8,050	8,179
April	8,428	11,050	12,133
May	8,467	11,220	11,597
June	8,203	9,699	8,996
July	7,816	9,127	11,376
August	5,921	6,458	7,870
September	4,592	5,430	5,751
Total	54,023	66,612	73,264

Higher Priced Cars			
	1922	1923	1924
January	283	212	292
February	273	606	357
March	632	821	674
April	862	1,180	972
May	961	1,059	808
June	865	815	609
July	678	760	667
August	516	542	478
September	511	553	461
Total	5,581	6,548	5,318

During September two cars in the low and medium priced field showed registrations in excess of 900, four others greater than 350 and eight others above the 100 mark. Registrations of two cars in the higher priced field exceeded 100.

INDUSTRIAL NOTES

Asch & Co. of New York City has taken over the manufacture and sale of the Kwik-Lift line of wrecking cranes. The factory will be moved to the plant at Derby, Conn., now occupied by Asch & Co., while the sales will be handled from its New York office.

California Court Holds
"4 Per Cent Tax" Invalid

LOS ANGELES, Oct. 15—An important decision affecting operators of commercial vehicles has been made by the Superior Court of Fresno County in holding what is known as the "4 per cent tax" to be unconstitutional. A law creating this tax was passed by the legislature in 1923. It provided that all operators of commercial vehicles, except those confined exclusively to municipalities, must pay 4 per cent of the gross receipts to the State.

The ruling that the law is unconstitutional was on the basis of its being discriminatory. The law exempted taxicabs and vehicles operating within a municipality not over a regular route.

VOLLRATH CO. 50 YEARS OLD

SHEBOYGAN, WIS., Oct. 13—The Vollrath Co. is celebrating its fiftieth anniversary in the enameling business this fall. Founded by Jacob J. Vollrath, the business is being carried on by his son, C. A. W. Vollrath, with W. J. Kohler, J. C. Vollrath, D. F. Riess and Fred S. Morris serving with him on the board of directors.

In 1892 the company began applying enamel to pressed steel shapes, and now this is the largest division of the business.

Mileage Basis Used
to Fix Freight RateInterstate Commerce Commission
Readjusting Schedules of
Eastern Lines

WASHINGTON, Oct. 15—Impending readjustment of automobile freight rates of the eastern trunk and short lines will not materially affect the automotive industry, in the opinion of members of the Interstate Commerce Commission.

Positive statement was made at the offices of the commission that no general upward trend of freight rates should be anticipated inasmuch as there will merely be an equalization of present rates with no view of netting the carriers an increase in revenue.

The holding of hearings on the proposed changes is being held up pending the receipt of all of the applications of the trunk lines.

Commission Proceeds Slowly

Commissioner Joseph B. Eastman, who is directing the freight rate equalization, points out that the Commission is proceeding slowly and that it doubtless will be a good many months before automobile manufacturers feel any effect of new freight rates.

Mr. Eastman has only recently concluded hearings on proposed rate changes in the southeastern district. Even now the rates which the Commission determined should be fair are being given a test period before finally being approved and placed in effect.

The commissioners make it plain that they are systematically going over the freight rates throughout the United States, by sections, in perhaps the most revolutionary manner ever before attempted.

The dominating note in the new fixing of rates so far as the automobile industry is concerned is to give automobile shippers at nearer points an advantage over automobile shippers at distant points; in short, to fix the rates on a mileage basis rather than on the present basis of market competition.

More Business-Like Basis

A practice of railroads "taking care" of particular shippers on their lines by cutting rates from time to time has helped develop the present tangled skein of traffic and tariff, in the opinion of the Commission. It is believed that the present sweeping investigation will go a long way toward putting the entire rate question on a firm and business-like level.

The Commission points out that the change in the rates will be so small that it will not affect the competition between railroads and motor transport. It reminds that it is a well established fact that the motor transport is more economical on the short haul and the railroad on the long haul.

Calendar

SHOWS

- Oct. 17-25—London, Annual Passenger Car Show, Olympia.
- Oct. 22-31—Paris, motor trucks, stationary engines, garage tools and machine tools, Grand Palais.
- Nov. 9-15—New York, Annual Automobile Salon, Commodore Hotel.
- Nov. 9-19—Buenos Aires, Annual Automobile Show, Pabellon de las Rosas, under the auspices of the Automovil Club Argentino.
- Nov. 10-15—Chicago, Annual Show and Convention of the Automotive Equipment Association, Coliseum.
- Dec. 1-13—Montevideo, Uruguay—Second Annual Motor Show, under the auspices of the Centro Automovilista del Uruguay, held in buildings of the Asocacion Rural del Uruguay.
- Dec. 5-14—Berlin Automobile Show.

Jan. 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.

Jan. 23-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.

Jan. 25-31—Chicago, Annual Automobile Salon.

RACES

Nov. 24—Los Angeles.

CONVENTIONS

Nov. 6-8—Chicago, First Convention of the National Standard Parts Association, Hotel La Salle.

Nov. 10-15—Chicago, Annual Convention and Show of

the Automotive Equipment Association, Coliseum.

Nov. 16-22—Chicago, Transportation Show, under the auspices of the Motor Truck Industries, American Exposition Palace.

Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland, Hotel Winton.

Nov. 18-20—Akron, Ohio, Annual Convention of the National Tire Dealers Association.

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

S. A. E. MEETINGS

Oct. 22-24—S. A. E. Production Meeting, Detroit.

Nov.—Indiana Section, Talk by H. A. Huebner of the Engineering Experiment Station of Purdue University.

Dec. 11—Indiana Section, Aviation Development, Major E. L. Hoffman; Superchargers, Dr. F. A. Moss.

Jan. 15—Indiana Section, Lubrication and Crank Case Dilution, W. S. Sparrow of the U. S. Bureau of Standards.

Jan. 20-23—S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Mar.—Indiana Section, Developments in Transmission.

Apr. 9—Indiana Section, Talk by F. E. Hunt, vice-president of the General Motors Research Corp.

Transportation Show Will Open New Bridge

NEW YORK, Oct. 13—A transportation exposition will be held in connection with the formal opening next June of the automobile bridge which is being constructed across the Hudson River from the tip of Anthony's Nose on the east bank to a point just north of Bear Mountain on the west. It will be promoted by the Peekskill and Bear Mountain Bridge Celebration Commission, of which Chauncey M. Depew is chairman and A. E. McKinnon of New York City, secretary.

Vehicles of all descriptions will be shown and the dedication will be an elaborate affair, with international boat races on the Hudson as part of the program. Inasmuch as the bridge is being built for automobile use primarily, it is expected that the motor industry will take a deep interest in the transportation exposition.

Announcement as to the plans for the opening were made last week when the last rivet was driven into the span by Former Gov. Benjamin B. Odell. It is the longest single span of any bridge in the world and is 1623 ft. in length. The event marks the last stage of construction. It is expected that the bridge will be open for traffic in January, although it will not be dedicated until June.

The bridge is the only one crossing the Hudson south of Albany, with the exception of the railroad bridge at Poughkeepsie. It is 2252 ft. long overall and 155 ft. above the water at its center. It will cost \$4,000,000 and the approaches \$2,000,000 more. Tolls will be collected by the Bear Mountain & Hudson Bridge Co. which financed the project.

TO TALK ON TREND IN DESIGN

CLEVELAND, Oct. 13—Prof. C. A. Norman of the Engineering Department of the Ohio State University will talk to the Cleveland section of the Society of

Automotive Engineers at the Old Colony Club, Hotel Cleveland, Monday, Oct. 20, on the subject of recent designs and trend in designs in European automotive practice. Professor Norman's talk will deal largely with the development of the supercharger in Europe and some of the special methods of springing practiced by foreign manufacturers.

Talbot Darracqs Take Honors at Brooklands

LONDON, Oct. 6 (by mail)—Talbot Darracq cars with 1½ litre engines secured first three places out of 24 starters today in the annual 200-mile race at Brooklands Track and showed marvelously consistent running throughout, the three cars finishing within two seconds of one another.

K. Lee Guinness was first, finishing in 1 hr. 58 min. 30 1/5 sec., an average speed of 102.27 m.p.h. This performance beats previous world's records for the distance, irrespective of engine size. George Duller, a noted jockey who has only lately taken to car racing, was second in 1 hr., 58 min., 31 2/5 sec., and H. O. D. Segrave, third, in 1 hr., 58 min., 32 1/5 sec.

All three cars were fitted with superchargers and were actually the same as those which competed in the French Grand Prix. The fourth car, an Alvis, last year's winning make, was six laps (approximately 16 miles) behind when the Talbot Darracqs finished.

AC BUYS FACTORY SITE

FLINT, MICH., Oct. 13—The AC Spark Plug Co. has bought a 23 acre factory site in this city from J. Dallas Dort, which will be developed in the immediate future. New factories will be erected for the manufacture of the AC air cleaner and another device for use on gasoline engines which the company will announce later. The property also will serve the company's expansion requirements.

Automotive Exports Gained 5.5 Per Cent

WASHINGTON, Oct. 15—Automobiles and parts, valued at \$111,680,000, represented 5.5 per cent of the total exports from the United States for the first half of this year. The total export trade during that period was \$2,089,263,000, an increase of \$143,704,000, or 7.4 per cent over the total for the first half of 1923.

Figures on our world trade covering the first six months of this year, compiled by the Foreign Commerce Department of the Chamber of Commerce of the United States, show that the gain in automobile export business ranks sixth in a field of 50 chief export commodities, comparing the first six months of this year with the same period last year.

They are: Hides and skins, showing an increase of 356.4 per cent gain over first six months of 1923; timber, 63.7 per cent; paraffine wax, 58.5 per cent; agricultural machinery and implements, 47 per cent; unmanufactured cotton, 37.3 per cent, and automobiles and parts, 57 per cent.

The value of automobiles and parts exported during January-June period, 1923, was \$81,529,000. Exports of passenger cars increased from 64,941 to 80,291, a gain of 24 per cent in number; motor trucks from 11,580 to 14,572, or 26 per cent; and parts and accessories from 136,386,000 to 219,600,000 pounds.

Automobile tires, the figures indicate, show a loss of 18.6 per cent in their export value this year.

ORDERS 2000 FREIGHT CARS

NEW YORK, Oct. 13—The Texas & Pacific Railway Co. has ordered 2000 forty-foot automobile freight cars, deliveries of which will start Nov. 15 at the rate of 25 a day. The cars are of southern pine lumber, with steel underframes, roofs and ends.